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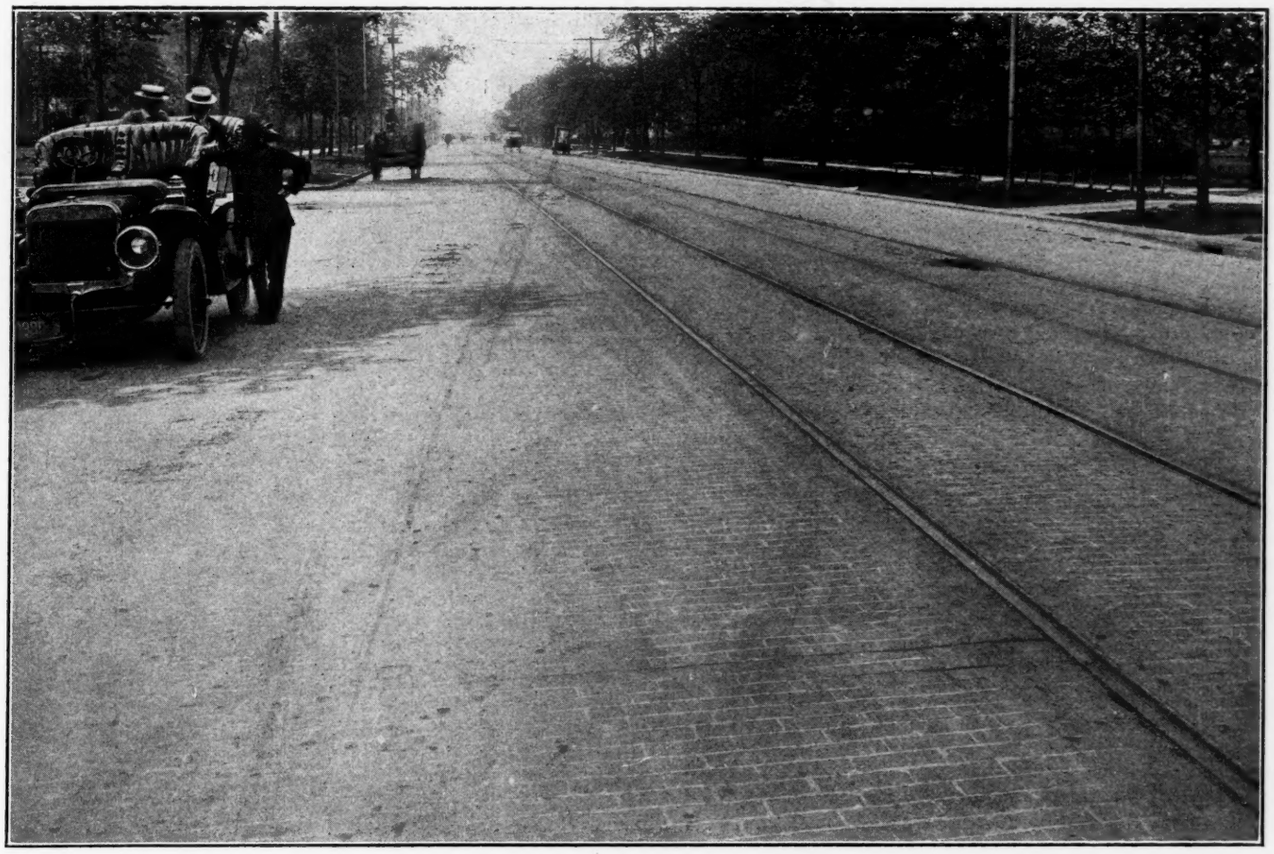


WEST FOURTEENTH STREET, CLEVELAND. CONCRETE FOUNDATION.

SAND VS. CONCRETE FOUNDATIONS FOR BRICK PAVEMENTS*

Relative Economy as Calculated from Experiences in Cleveland.—Sinking Fund and Interest Payments Required by Each.—Concrete Generally the More Economical and Effective.

In commenting on the relative economy of using a sand or concrete foundation under a brick pavement, the chief items to consider are first cost, maintenance and life. In the following discussion of these three items the experience of the Department of Public Service of the city of Cleveland, with Cleveland streets, is used principally.

Many of the city's streets are located in a sandy territory, in which it has been possible to lay pavements without bringing to the work from elsewhere any sand or gravel ballast. It has been the practice in such localities to prepare the bed of the pavement by means of the customary puddling, rolling and shaping, and laying the brick immediately upon the foundation thus prepared. In other sections of the city the streets are in a clay soil, and still others show an outcropping of shale or rock, to all of which any sand or gravel ballast or cushion must be brought.

Paving brick five inches in depth have been used to a large extent. This depth was adopted so as to ensure a block of adequate strength in itself, and also on account of the greater surface thus exposed for the adhesion of the cement grout filler. This has been thought specially advisable on sand foundations. But few brick pavements, and these in alleys and very light traffic streets, have been laid with four-inch paving brick, unless in connection with a concrete foundation.

Where the sand or gravel ballast must be brought upon the street, as in the case of clay soil, it is usual to specify such foundation to be eight inches in thickness. This depth of ballast, in conjunction with the five-

*Abstract of paper presented at the Cleveland meeting of Section D of the American Association for the Advancement of Science by Robert Hoffman, M. Am., Soc. C. E., chief engineer, Department of Public Service, Cleveland, Ohio.

inch depth of brick, requires extra excavation, which must be taken into account when considering comparative costs.

The cost of maintenance of a pavement, referring to repairs and not to street cleaning, must always be a very indefinite item. It depends entirely upon the standard of condition in which, according to someone's judgment, the pavement is to be kept. Very seldom can the repair and relaying of pavements be handled in the manner which theory indicates as advisable. Practical conditions, such as property owners' protests or petitions, available funds or popular demand, are generally the ruling factors, and it is on this account that the records of the older cities regarding the time that has elapsed between the laying and relaying of pavements are really the best and most available evidence.

It is with this idea in view that the records of the Cleveland Paving Department have been drawn upon for evidence relating to the subject of this paper.

The city first began to lay brick pavements in 1889, and has continued doing so ever since, until at present there are about 328 miles of streets paved with brick, subdivided as follows:

257.61 miles of 5-inch brick on sand foundation.
19.39 miles of 5-inch brick on concrete foundation.
39.17 miles of 4-inch brick on concrete foundation.
11.84 miles of 4-inch brick on sand foundation.

The prices paid for brick pavements have varied from $1.18 per square yard to $2.48, depending upon the various forms of foundation and size of brick used.

The following table, indicating the various paving combinations employed in Cleveland for brick pavements, shows the yearly average maximum and minimum prices paid per square yard since the year 1900. Cost of excavation assumed at $0.50 per cubic yard is included as measured below the top of the paving brick.

	Minimum.	Maximum.
5-in. brick laid on natural sand foundation...	1.18	1.56
5-in. brick laid on 8-in. sand or gravel ballast.	1.40	1.87
5-in. brick on 6-in. concrete foundation.....	1.94	2.48
4-in. brick on 6-in. concrete foundation.....	1.71	2.34
4-in. brick on 4-in. concrete foundation.....	1.47	1.73

The prices paid for the various combinations seem to rise and fall in the same years, which would indicate that the variations depended upon the material and labor market and not on the difference in combination.

The earlier of the brick pavements consisted of small blocks of fire clay, four inches in depth, laid upon a natural sand foundation. Some of these are still in use, though they have served to take the traffic of residence streets for twenty years. In other localities, partly on account of traffic conditions, brick pavements on sand foundations required relaying in less than fifteen years.

No pavements of brick laid according to recent specifications and practice, nor any laid on concrete foundations, have been in existence long enough to cause any thought of relayig.

In reference to the brick pavements that now require relaying, having a condition where any adequate repair would prove far too expensive, it could probably be shown that other defects, such as improper filler, poor brick, or defective construction, had as great an influence in causing deterioration as did the sand foundation.

Cleveland has stone pavements laid upon a natural sand foundation, which have been subjected to heavy traffic for over twenty years and are still in good condition. Such streets, it must be remembered, are in a sandy, gravelly soil, in well built up and well drained sections, so that the effect of frost in the subsoil is reduced to a minimum. An entirely different condition would probably be found in an open and poorly drained clay district.

In considering, then, the relative economy of sand and concrete foundations for brick pavements, experience will show that a properly laid pavement of five-inch brick on a sand foundation will have a life of at least fifteen years, if laid in residence or light business traffic streets. A four-inch brick under similar conditions would probably have a life of three or four years less.

The problem is to compare the cost of such a pavement with one laid on a concrete foundation, the actual life of which has not yet been determined by experience.

Referring to the cost data given herein, the following prices are obtained as the average for the last three years, therefore expressive of existing conditions:

	Per sq. yd.
5-in. brick laid on natural sand foundation.....	$1.27
5-in. brick laid on 8-in. sand or gravel foundation.	1.58
4-in. brick laid on 4-in. concrete foundation.....	1.60

Assuming a fifteen-year life for the five-inch brick pavement on a natural sand foundation, and the interest to be paid as four per cent., it will require a payment of nine per cent. per year to pay interest on the cost of paving and to provide a fund for its renewal at the end of fifteen years. This means an annual payment of nine per cent. of $1.27, or $0.1143.

In order to compare this with the case of a four-inch brick pavement laid upon four inches of concrete, the same annual payment of $0.1143 must be assumed. Deducting four per cent. of $1.60, the cost of such a pavement, for the interest charge, or $0.064, leaves $0.0503 to be applied per year for amortization. This amounts to a little over three per cent., and according to amortization tables would require a period of twenty-two years to provide the renewal fund.

In other words, the pavement upon the concrete must have a life of twenty-two years in order to be as cheap as the one upon the natural sand, having a life of fifteen years.

Comparing the cost of the five-inch brick upon a ballast of eight inches of sand or gravel with the brick upon four inches of concrete, it is readily seen that the difference is so small that both could have the same life at the same cost per year. Evidently then the concrete foundation is as cheap as the other, and much more economical as the probability of longer life is much greater.

A four-inch brick laid upon a natural sand foundation would cost about $1.07 per square yard, using the same cost data as used for the five-inch brick. If such a pavement had a life of twelve years, with money at four per cent., it would require an annual payment of about eleven per cent., or $0.1177.

Comparing this with four-inch brick on four inches of concrete, one sees that the latter would be equally cheap per year, if the life of the pavement were about twenty-one years.

It can similarly be shown that the five-inch brick would be as cheap as the four-inch, if the life were three years longer.

Similar calculations will show that a four-inch brick laid on six inches of concrete will be as cheap as four or five-inch brick on the eight-inch sand ballast, if its life is eighteen years.

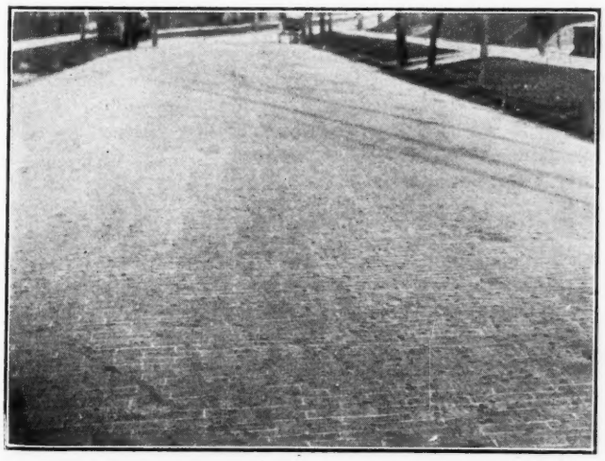
From this method of reasoning, it may be concluded that where a natural sandy foundation under good condition is found, it will probably be as economical to lay a brick pavement without a concrete foundation as with one, and the first cost will be considerably less.

In other locations, however, where it is necessary to bring upon the work from elsewhere the sand or gravel ballast, the first cost will be nearly as great, and the pavement with the concrete foundation will ultimately prove the more economical.

Several other matters must, however, be given consideration when passing judgment on this question. In Ohio, for instance, the municipality, though paying only a relatively small proportion of the cost of the initial pavement, namely, the part laid in street intersections and two per cent. of the remaining part, must pay fifty per cent. of the expense of relaying any pavement. It is therefore decidedly to the advantage of the municipality that a pavement be so laid that its life be as long as possible, so that the relaying expense shall come only at long intervals.

That an unyielding sub-base, such as concrete affords, is highly desirable goes without question, and it should be supplied wherever possible, and in most cases will prove more satisfactory, even at slightly greater cost. Concrete will carry the pavement load over the many soft places caused by street openings prior to paving and will prove a greater factor of safety against settlements and irregularities liable to occur where no concrete is employed. Any settlement in a pavement foundation breaks the bond of the brick and will be rapidly followed by serious deterioration.

Another possible economy in supplying a concrete foundation may be found in the possibility that some time it may be desired to replace brick with other kinds of paving material for which a concrete foundation must be supplied, such as wood block, asphalt or asphaltic concrete, in which event the cost will be materially lessened by reason of the existing concrete.



HOUGH AVENUE, CLEVELAND, LAID IN 1895.

In open country with poor drainage facilities, there is no doubt that the damaging effect of frost and the yielding sub-soil would soon depreciate any brick pavement with only a natural soil foundation, and there concrete is the only safe and economical foundation.

The pavements in Cleveland that have lasted so well on sandy foundation, it must be remembered, are on streets supplied with adequate sewerage and drainage, the abutting lots being well built up and graded, so that water easily finds its way to catch basins and sewers, and all conditions are such that the heaving effect of frost is at a minimum.

Cleveland's greater mileage of brick on sand foundation is explained by the custom of former years. Improved concrete mixers and low cost of cement have made the use of concrete economically possible where in earlier years the cost would have produced a prohibitive tax upon the abutting property, and therefore is now employed to as great an extent as possible.

HOLMDEN AVENUE, CLEVELAND, LAID IN 1899.

There is every justification, except in case of an abnormally high price, in so laying a pavement that it may be durable and serviceable. The interruption to business and traffic by reason of relaying pavements is difficult to value, but nearly always represents a large monetary loss. It is therefore entirely justifiable to make allowances in favor of a construction promising a longer life even though it may not seem theoretically the more economical.

As an illustration of the above article, we present photographs of some of the brick pavements in Cleveland, which photographs were kindly furnished at our request by the National Paving Brick Manufacturers' Association.

Two of these show streets laid upon a natural sand foundation, with cement filler. Hough avenue, laid in 1895, is said to be subject to heavy traffic, but is to-day in excellent condition after 18 years' use. Holmden avenue was laid 14 years ago and is subject to medium traffic. It shows little sign of wear and has received no repairs during that time. The third illustration is that of a modern pavement laid in 1905 on concrete foundation. It is said to carry the largest portion of the heavy traffic between the eastern and western sides of the city, but little sign of wear is apparent due to 8 years of this traffic. Cleveland will probably add about 45 miles of brick pavement this year to the three and one-half million cubic yards already in service.

MUNICIPAL DAILY NEWSPAPER.

Dresden, Germany, had bequeathed to it some years ago, a newspaper which is operated by the city, two-thirds of the profits of the enterprise being used by the city for beautifying it and for charitable purposes, the remaining one-third being paid to the heirs of the original proprietor. Later, the owner of the printing establishment which had printed this paper since 1848 gave the entire establishment to the city without retaining any share of the profits for himself or his heirs, the profits from this establishment to be used by the city in the same way. It is reported that the combined profits from the paper and printing house now amount to about $60,000 a year.

STREET MAINTENANCE COSTS.

Discussion of Increase of Cost with Age of Pavement.—Some Data from Trenton.—Advantage of Municipal Repairing.

By JOS. E. ENGLISH, Assistant Engineer of Streets, Trenton, N. J.

Perhaps there is no phase of street paving quite as important as the proper maintenance of the pavement after it is put down.

The city of Trenton has taken rapid strides along this line since the introduction of commission government in 1910. There have been many reforms introduced in connection with the Engineering Department that seemed impossible under the old form of government, but the writer wishes to confine his remarks to the subject of street maintenance, which is the one most interesting to himself.

There have appeared during the last few years many articles in the various engineering papers on the subject of keeping street maintenance costs. From an economic standpoint, a system for keeping accurately the yearly maintenance cost of each paved street in the city is one of the most valuable assets a city can have, and yet it is a subject that is given entirely too little attention by a majority of the cities today.

There is no doubt that there comes a time in the life of every pavement when it would be more economical to resurface than to continue patching, although the theory has been advanced that a pavement can be patched indefinitely and never wear out. Perhaps there is some ground for this belief, but the writer does not believe it would be sound economy to continue patching a pavement beyond a certain point.

There have been several theories advanced as to the proper time to resurface a pavement and in each case these theories are the result of a good deal of study, far more than the writer has had the opportunity for. It is not his desire to criticize these theories but simply to comment upon them from the standpoint of our own streets. They are being mentioned principally to show the importance of keeping systematic yearly maintenance costs, which it will be seen is the information necessary to deal with the subject intelligently.

Whinery says: "The cost of maintaining a pavement increases with its age and in each individual case there must come a time when the cost of maintenance is so great that it will be cheaper to reconstruct the work than to continue making repairs. This point is reached of course when the cost of maintenance exceeds the cost of reconstruction."

This sounds simple enough, and from the above statement it would seem to appear that the solution of the whole problem was simply a matter of keeping the necessary records. However, the increase in maintenance referred to in the first part of Whinery's statement seems to be conspicuous by its absence in the case of some of our pavements, while in others the increase is quite regular. This may be due to other causes, such as faulty repairs by the contractor during the guarantee period, or it may be caused to some extent by the lack of proper inspection when the pavement is patched after having been opened by the Public Service Company, or for any other purpose. This latter cause is one of the utmost importance, since if a pavement is not repaired properly after it has been opened a point of weakness is formed which will fail in a very short time and be classed as a natural wear-out, but improperly so.

The writer believes that this matter should be under the control of the city and that all repair work done to openings made in the pavement should be strictly under the supervision of a competent inspector furnished by the city. This must be so before the true value of our maintenance data can be realized.

The engineer of the Cincinnati Bureau of Municipal Research, J. E. Barlow, who has gone into the subject very thoroughly, says: "As the life of the pavement increases, the necessary annual payment to the sinking fund decreases while the annual cost of repairs increases. It is believed that the proper time to renew the surfacing is when the sum of these two variables is a minimum. Under such conditions the public would have had the use of the pavement during its life at a minimum cost per year, the entire capital invested being still intact." (*Municipal Journal*, January 18, 1912.) Mr. Barlow's theory seems also to be based upon the assumption that the cost of maintenance increases with the age of the pavement. While this increase is not shown in the case of our pavements, the writer believes that such an increase would be experienced under ideal conditions. The solution would then seem to be in getting under control certain elements which enter so largely into the matter, namely: (1) The patching of the pavement during the life of the guarantee; (2) the patching of the pavement after it has been opened for any purpose. The first of these could be taken care of by eliminating the guarantee entirely, and the city doing its own repair work. The city of Trenton did its own patchwork last year with grand results and expects to install a modern plant in the near future, perhaps in time to take care of the coming season's work.

There are several advantages to be gained by the city doing its own repair work. Outside of lowering the cost of repairs which, of course, is the ultimate aim, it also facilitates the compiling of the maintenance data, for with the right man at the head of the plant he can co-operate in keeping his records in a convenient form, so that it becomes an easy matter to copy off the necessary data for the maintenance sheets at the end of each year.

Another advantage of this system over the contract system is the promptness with which the repairs are made. The method has been adopted here of having the police report the wear-outs, and in this way no holes are allowed to go unnoticed for any length of time, and are attended to as soon as they are reported.

As was stated before, our system for compiling maintenance data was not adopted until the latter part of 1910; and as we were only able to go back two years with any degree of accuracy, our data to date only cover a period of four years. This is hardly a sufficient length of time to form any definite conclusions from the data at hand, but it is interesting when viewed from the standpoint of the above mentioned theories, in that it shows such an utter lack of regularity for the different years. However, the writer believes that this is due to other influences rather than that the above theories are at fault.

Below are the records of five of our streets for the first four years after the expiration of the guarantee. They are picked out as representing an average condition.

1. Broad street from Greenwood avenue to Factory street.
2. Broad street from Hudson street to Liberty street.
3. East Front street from Montgomery street to Stockton street.
4. East Front street from Broad street to Montgomery street.
5. Passaic street from Calhoun street to West Hanover street.
6. Division street from Hamilton avenue to Roebling avenue.

7. East Hanover street from Warren street to Stockton street.
8. Perry street from Warren street to Canal street.

NUMBER OF YARDS REPAIRED.

	Street Number.							
Year.	1	2	3	4	5	6	7	8
1909	49.8	18.0	None	243.	37.0	11.0	106.0	9.8
1910	36.8	11.6	223	223	33.4	None	28.9	42.3
1911	13.6	101.4	1,006.6	419	134.2	20.6	581.5	26.65
1912	45.5	12.3	90.8	78	18.8	114.0	108.5	66.5
Date paved	1903	1903	1899	1902	1902	1903	1903	1903
Length of guarantee years	5	5	10	5	5	5	5	5
No. of yards in pavement	4,577	13,917	6,435	1,763	4,291	7,111	6,234	4,582
Kind of asphalt	Trinidad	Trinidad	Trinidad	Trinidad	Trinidad	Trinidad	Trinidad	Trinidad

It will be seen upon inspecting the above records that the maintenance is very irregular. In the case of East Front street from Montgomery street to Stockton street (No. 3) the maintenance for 1911 was approximately one-sixth the entire area of the street. However, the guarantee on this street was for ten years, and if the pavement was not properly taken care of during this period it would be very apt to fail in a short time after the expiration of the guarantee, which it did.

The number of yards of repairs on E. Front street from Broad street to Montgomery street (No. 4) for the first three years is very high compared to the total area of the pavement, and then there is considerable drop for the fourth year. However, the traffic on this street is very heavy, and we would rather expect a higher maintenance than on some of the other streets.

In the case of Broad street from Greenwood avenue to Factory street (No. 1) it will be noticed that the maintenance is quite regular and comparatively low. This is a heavy traffic street, but quite wide, and the traffic is not confined as in the case of E. Front street. However, it seems to be standing up better than some of the other streets.

It seems to be hard to form a conclusion from the above data, principally because of the short period covered, and yet if the maintenance is supposed to increase with the life of the pavement why should not that increase be shown during the first four years?

The author believes, as he stated before, that under ideal conditions this increase would occur, and the problem can be solved only by getting as near these conditions as possible. Each city must investigate the matter for itself, for, after all, the solution must be largely a matter of individual judgment.

The compiling of maintenance data is the first step that must be taken if the pavements are to be treated on strictly an economical basis. Outside of determining the proper time to rebuild a pavement, the data are of value in determining the relative merits of the different kinds of pavements, and the adaptability of these pavements to the different kinds of traffic. This latter field of usefulness is quite as important as the first.

BITUMINOUS GRAVEL CONCRETE PAVEMENTS.

Characteristics of the Gravel Used.—Addition of Asphalt Increases Stability and Durability.—Low Cost of Construction.—Other Advantages.

(Continued from page 298.)

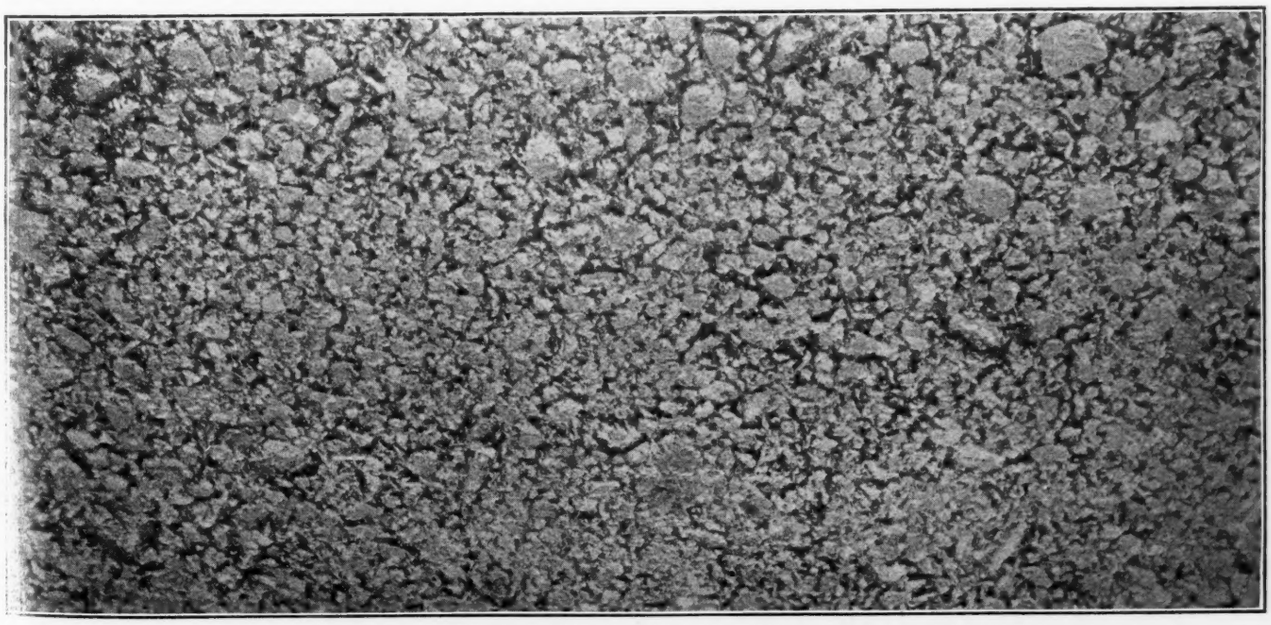
This gravel is composed of calcareous sandstone, granite and quartzite, associated with a considerable amount of finer particles of the above-named rocks, together with a percentage of clay. This latter substance gives the gravel a good cementatious value, which is an essential to the comparative permanency of the pavement. The clay acts as a catalyzer on the asphalt, making it more viscous, less volatile and also less brittle.

The success of this pavement, in the writers' mind, is due to the physical qualities possessed by the gravel that was used as the mineral aggregate, the gravel being Hudson River Cementatious Gravel, of which there are many pits along the banks of the Hudson River and at least three that are developed commercially.

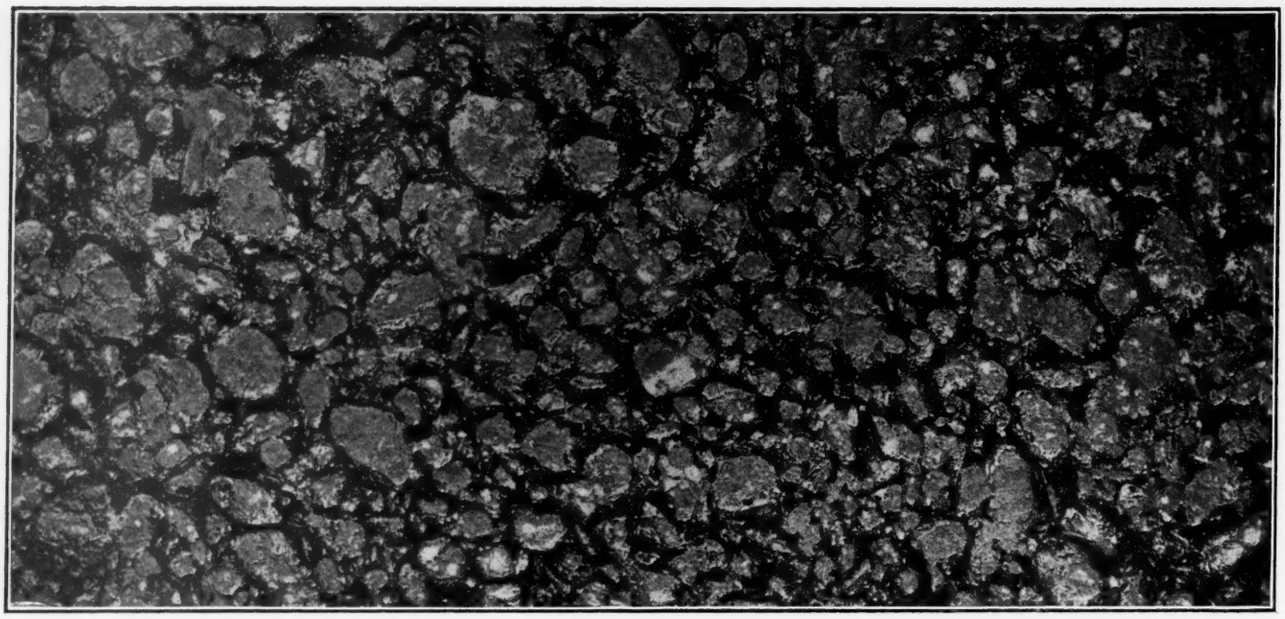
The nature of this material was brought to my attention first by its general use on the parkway system of New York City and many of the country roads on Long Island where it had been used very successfully as a water-puddled roadway until the advent of the motor vehicle.

It occurred to the writer that if it was possible to use this material and obtain similar results with an additional element in its composition that would insure its resistance to motor traffic, that it would be an economical and desirable result.

I believe it will be generally conceded that a gravel roadway, when in condition, is as desirable and as comfortable a roadway to travel upon, especially for country and park purposes, as any that have been presented to the public.



PAVEMENT AFTER ROLLING. CAMERA ABOUT 4 FEET ABOVE SURFACE.



PAVEMENT AFTER ROLLING. CAMERA ABOUT 18 INCHES ABOVE SURFACE.
Particles of stone showing light are fully covered with asphalt, this appearance being due to reflection of the light on the smoother portions.

This composition of gravel and asphalt retains all the agreeableness of travel and also retains the appearance of the original gravel road. At the same time it has the added feature of comparative stability and resistance to wear of other pavements that could be justly classified as those belonging to a city or a populous village.

Pavements of a semi-permanent nature, now commonly used in cities and villages, seem somewhat out of keeping with the surroundings when placed upon park driveways or country highways, being noisy, hard and unattractive.

This mixture of gravel and asphalt overcomes all these criticisms by being comparatively noiseless, resilient, easy riding, and conforming to our ideals of what should be the appearance of a country or park driveway, and in addition to this it possesses a feature which not only the driver of a horse, but also the users of automobiles can readily appreciate, namely, that it has a "non-skid" surface.

Another feature of this pavement which has appealed to the writer is the lower cost as compared with other so-called permanent pavements.

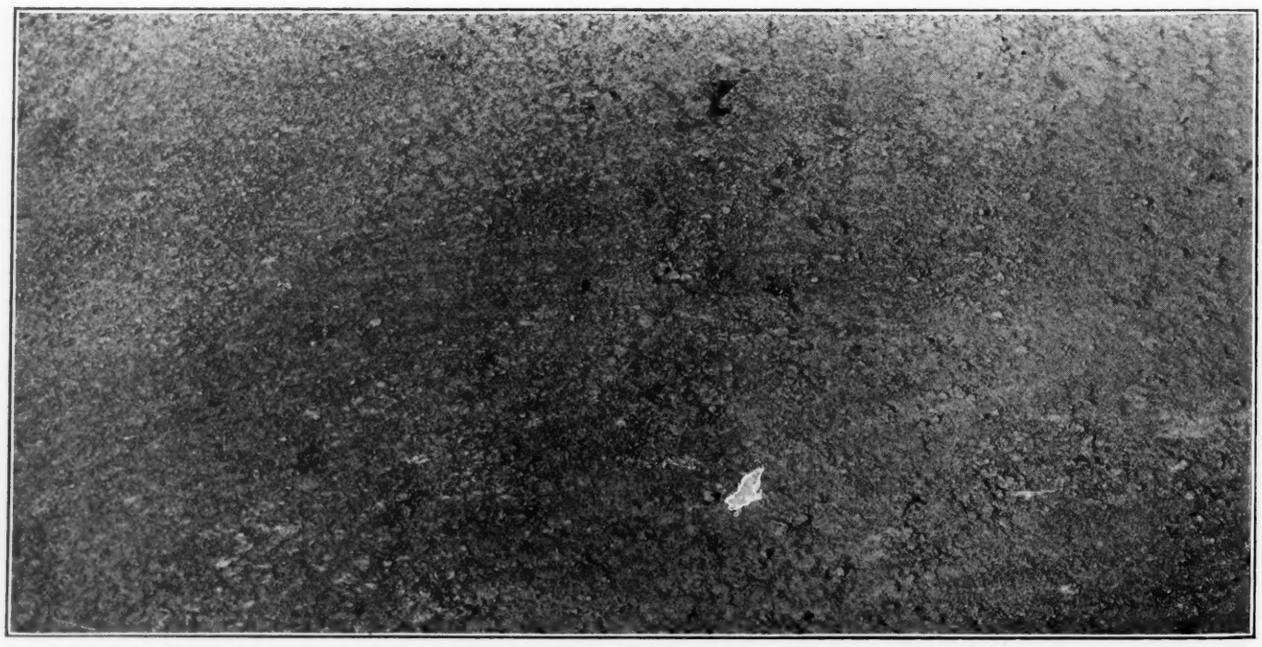
The average price bid by contractors for a pavement 2½ inches deep of this nature has been $0.85 per square yard. From reports of engineers in immediate charge of the different contracts, the percentage of profit has varied from 0 to 15 per cent. On this basis I considerer an engineer's estimate for this work should be $0.85 or $0.90 per square yard under similar conditions of accessibility to the materials that compose the pavement.

The cost of the mineral aggregate averaged $3.25 per cubic yard on the site of the work.

The cost of the asphalt averaged $0.15 per gallon on the site of the work.

On one road the contractor erected a central plant at the railroad station, involving a cost of about $8,000.

On another road the contractor made use of a portable plant costing about $2,200. This plant was designed



FINISHED PAVEMENT AFTER CLAY AND SCREENINGS HAVE BEEN PUDDLED AND ROLLED IN.

to carry the mixture by means of an extending arm from the mixer to the place where the pavement was being laid. This necessitated a constant shifting of the plant.

Another contractor used a portable plant, moving it on an average of 1,000 feet, and transporting his mixture by means of horse drawn steel carts.

This last method I consider the most satisfactory and economical.

Where the above described ingredients can be obtained, I believe this form of pavement to be worthy of investigation and consideration.

First, on account of its comparatively low cost.

Second, because of its adaptability to country and parkway purposes, due to the easy riding surface, and its conformity to our ideals of the surroundings of a parkway or country highway.

Third, on account of its non-slippery nature, it being practically a "non-skid" road.

Examples of this pavement can be seen on Central avenue, from the northerly line of the City of Yonkers extending northerly towards White Plains for 2¾ miles. In this case the pavement was placed upon an old macadam foundation.

On the south shore of Long Island in the village of Amityville, built upon a gravel foundation.

On the south shores of Long Island in the village of Babylon, built upon a gravel foundation.

On the road extending from East Hampton to Sag Harbor on Long Island, built upon a trap rock sand filled foundation.

BITUMEN-SURFACED CONCRETE PAVEMENT.

Concrete pavements with bituminous wearing surface have been used for the past four years in Appleton, Wis., with very good results, according to C. H. Vinal the city engineer, who sends us the specifications under which they were built. These provide for a sub-foundation of 2 inches of sand and cinders mixed one to one and thoroughly rolled or tamped; the sub-grade having previously been rolled. Upon this base a 5-inch concrete foundation was laid mixed 1:3:6. This was provided with expansion joints along each curb, around all manholes or other fixtures, down the centre of the street if this should be more than 28 feet wide, and crosswise of the street every 40 feet; these expansion joints being from three-quarters of an inch to 1 inch in width. The edges of the transverse expansion joints are protected with 2½" x 2½" steel angle irons, rolled with a corrugated or diamond surface to prevent being slippery; these angle irons being set so that their upper surfaces come flush with the wearing surface, and anchored to the concrete with anchor bolts. The joints extend the full depth of the concrete foundation and are completely filled from the bottom to within a half inch of the top of the finished pavement with asphalt poured into the joints at a temperature not lower than 300 degrees.

After the concrete base has been placed and before it has begun to set, a 1¾ inch wearing surface is placed, which is composed of 1 part Portland cement to 1½ parts of crushed rock, from which all dust has been removed; the crushed rock consisting of approximately 40 per cent. of ¼ inch size, 20 per cent. of ⅛ inch size and 15 per cent of 1/16 inch size; the balance of about 25 per cent being sand. The exact proportion of these materials, however, may be varied by the engineer in order to obtain as dense a mixture as possible. Crushed stone and cement are mixed dry and then wet to the proper consistency, deposited on the concrete and worked or floated to a uniform surface which it is specified shall be free from waves or honeycombs. The surface is then treated by drawing a tool similar to a garden rake both crosswise and lengthwise of the street so as to cut the surface into squares of 2½ inches on a side, the cuttings being about half an inch deep.

The paving is then allowed to dry, when the entire surface is covered with a coat of asphaltic cement, heated to a temperature of not less than 300 degrees and poured or spread over the surface to a depth of about one-eighth of an inch; mops, brooms or squeegees being used for this purpose. On this is spread evenly a dressing of fine stone chips heated to at least 250 degrees, enough being used to cover the entire surface. When the asphalt is cold the road is ready for traffic, which rapidly wears in or wears away the chips.

BITUMINOUS SURFACES ON BRICK PAVEMENTS.

In 1896 Minneapolis, Minn., laid its first brick pavement at a cost of $1.89 per square yard. This was laid on a 6-inch concrete foundation made of natural cement, one street being laid with a pitch filler and another with a cement grout filler, both of which are said to have given fairly good satisfaction. Soon after this, both kinds of filler were abandoned and sand was used almost entirely until 1906. These sand-filled pavements are said by assistant city engineer Ellis R. Dutton to be as good as the others, if not better; no difficulties were experienced due to expansion, no rumbling noises, and the edges of the brick appeared to be protected as well as with the other kinds of filler.

During the past few years, however, since the city adopted flushing machines for street cleaning, it was found that the sand was washed out of the joints and the pavements were becoming rough; and in 1906 the use of asphalt filler was begun, and has been employed since then. Mr. Dutton states that the quality of the asphalt filler, especially its adhesiveness, has been improved during the past year or two, and it was suggested that this material be used not only for the joints but also for coating the top of a brick pavement, both making the street less noisy and preventing chipping, and half a block was treated in this way in the spring of 1912. The asphalt was applied hot, using about half a gallon per square yard. The joints as well as the surface of the brick pavement were thoroughly broomed and dried before the asphalt was applied, and after the application the surface was covered with a thin coating of coarse sand. The asphalt used adheres to the brick very well, does not become excessively soft in the hot sun and has shown no chipping effect in cold weather, has reduced the noise, gives a better foothold for horses and greatly improved the appearance of the street.

This was so satisfactory, Mr. Dutton states, that in constructing new brick pavement in 1912 the same method was followed, using about ten pounds of asphalt per square yard. This did not increase the cost over that of filling the joints only, however, as the labor cost was so much less. About 38,000 square yards of brick pavement were treated in this way last year. A year's experience with this seems to indicate that the adhesion of the asphalt to the bricks leaves something to be desired; but in spite of this Mr. Dutton believes that this makes one of the best of city pavements. The bituminous surface will, of course, wear off, but can be renewed at small expense, while the bricks themselves will wear very little. In applying the asphalt, the surface of the pavement must be thoroughly clean and dry and a bitumen used which is exceedingly adhesive, does not soften too much in summer or become brittle in winter, and which does not lose its "life" by the evaporation of its more valuable constituents.

BITUMINOUS CARPET SURFACES*

Serviceability Depends upon Road Crust, Carpet Itself and Character of Traffic.—Steel Tires Destroy It Rapidly.

A bituminous carpet surface is well defined as "A bituminous surface of appreciable thickness formed on top of a road crust by the application of one or more coats of bituminous material, with gravel, sand or stone chips added." Such a carpet is not formed by the use of oil emulsions, consequently, emulsions will not be considered in this discussion, nor will a crust approximating two inches in thickness be considered, inasmuch as when a coat or blanket is made of such thickness, it ceases to become a carpet, but rather becomes an integral part of the road crust or pavement.

Limitations in the use of bituminous carpet surfaces are governed by three principal features: First, character of the road crust under the carpet; second, character of the carpet itself, including both the bitumen and the grit or such material as is applied with the bitumen; third, character of traffic to be sustained. Taking these in their order named, let us first consider the character of the crust.

This should be of such a nature and on such foundation that the weight of the traffic will be thoroughly sustained without any aid whatever from the carpet. For average traffic on suburban roads, a waterbound macadam road on a suitable and sufficient foundation is an ideal crust upon which to apply a bituminous carpet, regardless of the nature of the bitumen used to form the carpet. Under some conditions, a cement concrete crust is excellent and preferable to waterbound macadam, in that it has more stability and will withstand a greater load. A concrete crust, however, does not appear to hold a carpet of an asphaltic nature as well as it holds one formed by the use of tar, the adhesion being apparently less with the former than with the latter material. A crust of good gravel, thoroughly compacted, is good under restricted traffic conditions, but it does not appear to hold a carpet formed by the use of heavy asphaltic or tar binders, unless the carpet is made of such thickness that it becomes a part of the road crust. (By "heavy binders," as referred to herein, is meant binders that require heating to a temperature of at least 180° F. in order to permit satisfactory application.) A bituminous carpet on a gravel road appears to be successful under comparatively light traffic if a bitumen is used that does not require heating to a temperature above 100°F. before application.

A carpet formed by the use of any material on a dirt road is of no value whatever, as it breaks up under any kind of traffic and very soon ceases to be a carpet.

Continuing to the second principal feature, namely, the character of the bituminous carpet, we have again a very important factor. The kind of bitumen used and the method under which it is applied, the kind and amount of grit used, and the character of the grit, each and all have a very decided influence on the limitations of economical use. Experience has shown that a carpet must be uniform in thickness, and in order to be so, the bitumen and grit must each be spread uniformly, and in order to spread the bitumen uniformly, experience has shown that it must be distributed by means of pressure applied in some manner, either by introducing air or steam pressure directly into the tank in which the bitumen is contained, or in securing pressure by means of a pump of some form. Experience has demonstrated also that where it is desired to make a carpet requiring the bitumen to be applied at the rate of one-half gallon per square yard, uniformity is more successfully obtained by applying the bitumen in successive layers of approximately one-quarter of a gallon per square yard, each layer of bitumen being covered with grit before the succeeding layer is applied.

The grit used for covering the bitumen should contain no clay or loam, and if the traffic to be borne is a mixed traffic, with steel tires predominating, it appears that the best and most lasting results are obtained by using a mixture of coarse and fine material, the coarse material consisting of tough pebbles, or stone broken to pebble size (approximately one-half inch in diameter), mixed with material of a finer nature, such as sand or a coarse grade of stone dust. Such mixing is better accomplished if the two grades of grit are applied separately in forming the blanket, that is, the coarser material being applied first and immediately followed by the finer material. Such method of application appears to give a firmer carpet that will withstand a greater amount of steel tire traffic than will a carpet formed by the use of either coarse or fine material alone. If a carpet is to carry a traffic consisting largely of automobiles, the coarser material does not become as necessary, although it appears to be desirable.

The kind of bituminous material that it is preferable to use in a carpet is still a debatable subject, particularly as to whether tar or asphalt products are preferable; and in the use of asphalts, whether a heavy asphalt requiring high temperature (200°F. or more) before application is preferable to one that does not require such high temperature. It has been the experience and observation of the writer however, that the asphalts requiring high temperature before application give better and more permanent results under a mixed traffic than do the lighter asphalts. By mixed traffic, the writer means a combination of trucks, automobiles and heavy and light horse-drawn vehicles. A carpet formed with a heavy asphaltic material, however, does not withstand traffic consisting largely of heavy steel tired vehicles, the effect of such being to cut the blanket and cause it to crumble and to soon disappear from the surface.

The third principal feature, namely, the character of traffic, must necessarily be considered in connection with the second principal feature, already discussed. In fact, neither one of these three features hereinbefore mentioned can be discussed entirely by itself, as each is dependent somewhat upon the others. With a suitable road crust to sustain a bituminous carpet, traffic is an extremely important factor in determining what type of materials to use for such a carpet. The amount, type and weight of vehicles must necessarily be considered. It has been demonstrated that a tar carpet will carry economically 100 automobiles per day per foot in width of roadway, together with a horse-drawn traffic of 15 vehicles per day per foot in width of roadway. On the other hand, a similar tar carpet failed under a traffic consisting of 20 heavy horse-drawn steel tired vehicles per foot in width of roadway per day, with only 8 automobiles per foot. This clearly demonstrates that a tar blanket is not suitable and should never be used to sustain heavy horse-drawn traffic, but is suitable and economical in carrying automobile traffic. Inasmuch as no particular wear appeared to be caused by the above mentioned automobile traffic, it is safe to assume that a much larger traffic could be economically carried. Records kept by the writer show that what has been stated above regarding the tar carpet, is true also of the heavy asphaltic oil carpet. Failures that have occurred

*Presented at the Cleveland Meeting of Section D of the American Association for the Advancement of Science by Arthur W. Dean, M. Am. Soc. C. E., Chief Engineer, Massachusetts Highway Commission, Boston, Mass.

under the writer's observation with a heavy asphaltic oil carpet have occurred where the ratio of the number of automobiles to the number of horse-drawn vehicles was not any greater than two to one, and if the horse-drawn vehicles are of the heavy two-horse type, with narrow tires, no amount of automobile traffic appears to be sufficient to counterbalance the destructive effect of 15 heavy horse-drawn vehicles per foot in width per day.

The writer is of the opinion that it is not wise at the present time to state general positive conclusions regarding limitations in the use of bituminous carpet surfaces. Such surfaces have been in use in this country only about four years, and the character and quality of the bitumen used at various times and in various places are so unequal, and the character of traffic over the highways is and has been changing so rapidly, that the results of experiments and observations have been variable. Positive and definite conclusions as to limitations can only be drawn after careful observation through a period of years, keeping a record of the kind and quality and amounts of material used in the carpet, and of the kinds, number and approximate weights of vehicles passing over the sections under observation.

OIL MACADAM PAVEMENT

Description of that Laid by City of Grants Pass, Oregon. —Important Details of Construction.— Importance of Supervision.

In a paper before the Southern Oregon Good Roads Association, F. E. Hobson, city engineer of Grants Pass, Ore., read a paper describing the kind of pavement which was laid by this city in 1912, which he considered to have some features, especially in the construction methods, in which it excelled others with which he was familiar.

The foundation for this pavement was of crushed rock of a size which would pass a 3-inch ring and be retained upon a 1½-inch screen, the depth of which after being compressed with a 10-ton roller was 4 inches, the top being 2 inches below and parallel with the surface of the finished pavement. Where it seemed desirable to the engineer a coarse toothed harrow was run over the stone, the teeth reaching within 1 inch of the sub-grade, to thoroughly mix the stone and reduce the loose volume to a minimum. It was then compressed with a 10-ton roller, rock screenings being spread uniformly over the surface and slightly watered during the rolling, "great care being taken at all times that there be no excess of screenings applied so as to take the weight and motion of the roller, thereby displacing the larger pieces of rock which have already become interlocked, but merely sufficient to fill the voids in the compact stone base with as little disturbance as possible."

On this base the wearing surface was placed, having a finished depth of 1½ inches and consisting of crushed rock which would pass a 1½-inch ring and be retained upon a ¾-inch ring. When this had been thoroughly compressed, stone chips having been added during the rolling to fill the excess voids (if this may have seemed necessary) liquid asphaltum was applied at the rate of not more than one gallon per square yard, on which there was spread and swept with hand brooms stone chips which would pass a ¾-inch screen and be retained on a ¼-inch screen, sufficient in quantity to fill the voids in the wearing surface and form a layer ½-inch thick. Before rolling, more liquid asphaltum to the amount of about three-fourths of a gallon or less per square yard was applied, and while this was still hot a thin layer of stone chips was scattered on it, these being such as would pass through a ¼-inch ring; following which the pavement was rolled with a 10-ton roller. This roller was equipped with water pipes having small perforations so arranged that they could distribute steam or water over the surface of the roller wheels to prevent the asphaltum from adhering to them. After this surface had been thoroughly rolled and stone chips added so that there were no signs of the asphalt "bleeding," more asphaltic binder was added, sufficient to cover the stone chips, on which there was spread by means of brooms or brushes, enough coarse, clean sand or stone dust to absorb the last application of asphaltic binder; after which the surface was again rolled, more sand and asphalt being added, if necessary, and the rolling continued until a smooth, even surface was obtained with no excess of oil, sand or stone chips.

It was specified that the liquid asphalt should be applied at a temperature of between 200° and 300° F.; that it should contain not less than 95 per cent. asphalt, and have a penetration not harder than 50° at 77° F. and conform in detailed analyses to the A. S. P. S. specifications of 1912. It was required that the asphaltic oil be uniformly distributed over the surface by a distributing machine worked at a pressure of at least 30 lbs. per square inch.

In discussing the specifications, Mr. Hobson gave it as his opinion that the greatest number of failures in bituminous macadam pavements have been due to inefficient supervision rather than inadequate specifications. "The building of the base course as herein described is familiar to all road builders, but some might not have noticed that in using exactly the same size, quality and quantity of crushed rock, screenings and chips, and with the same amount of sprinkling and rolling, like results are not obtained at all points of the work. This irregularity in results is due in a measure to the relative position of the varying sizes from 1½ to 3-inch crushed rock as it is spread before being rolled. The writer has noticed that in hauling crushed rock a distance of no more than one mile, by motor truck carrying 4 or 5 cubic yards, and at the same time by wagons fitted with the old-fashioned sand or gravel boxes, the material delivered by the motor truck has to all appearances the same relative mix of sizes as found in the bunkers or as delivered at the crusher; while in that material delivered by the slow jiggling wagon, a surprisingly large percentage of the smaller sizes have been shaken to the bottom of the load. Thus it is obvious that when the spreading is done, the top of the load or the larger size will be spread in a layer by itself, and the smaller sizes left where the load was dumped. The same condition to a less degree is noticeable in the wearing surface materials. The more care there is taken to overcome these little irregularities, the more quickly and economically the road may be finished."

By not adding the screenings to the first layer of the wearing surface until after the application of asphaltic oil by the spraying machine, Mr. Hobson found that the use of ¾ of a gallon per square yard of surface was sufficient to thoroughly coat all exposed surfaces of the crushed rock and in addition provide a light seal coat of asphaltum on the water bound base, "which could not be the result if the voids were filled and rolled before this application of the binder."

He found that a great deal of trouble in rolling the finished surface was obviated by using the perforated pipes referred to in the specifications, by which steam or water was distributed over the surface of the roller

wheels to prevent their pulling up the asphaltum-coated material.

Less than 1½ gallons of asphaltic binder per square yard were used in the pavement, and contracts were awarded for the same for from 99 cents to 1.045 per square yard. "No waves or irregularities in the surface are noticeable, and even in the summer weather the surface is so hard that horse shoe prints are rarely seen; and by scraping the surface with a sharp steel tool a gray mark is made in what appears to be solid rock instead of a black furrow in an excess of bitumen as is often the case in other asphaltic pavements. There is no sign of disintegrating during the winter, nor any bleeding or wavy places formed during the warm weather." The asphaltic binder used last year was Standard Oil Company's road oil Number 3, which cost about 8 cents per gallon f. o. b. Grants Pass. The writer had used the Ward automatic asphalt atomizer and the Pillsbury asphalt sprinkler, both giving apparently equally good results.

PAVEMENTS AND TRAFFIC PREFERENCE

Census of Traffic on Heavily Traveled Road to Determine Choice of Drivers Between Stone Block and Wood Block.

A great deal has been said during the past few years about durability of pavements, less about the noise and other features which appeal to the occupant of the abutting property which in many cases pays for the pavement, but very little is said about the preference of the users of the pavements. These users might really be considered under three classes—the owner of the vehicle, the driver and the horse. The owner is, presumably, chiefly interested in the wear and tear to the vehicle and the breakage or other damage to its contents. The driver prefers a pavement which makes riding easy; and, presumably, the horse desires a pavement which is not slippery and which will reduce the pull upon the traces to a minimum. In a general way, however, the same conditions are desired by all three of these, namely, a smooth pavement which will neither jar the wagon and its contents, including the driver, nor increase the tractive resistance; and at the same time a pavement on which the horse will not slip nor an automobile skid.

A few weeks ago the City Planning Commission of Newark, N. J., received a report from two engineers upon the proper pavement to be used on Broad street, the principal business street of the city. The engineers discussed the several advantages and disadvantages of the pavements at present considered as standard and agreed that wood block and stone block possessed nearly equal advantages for the street in question. The Broad Street Merchant's Association have favored wood block, while the Board of Works apparently favors stone block.

In order to learn in the most practical way the choice of teamsters, Harland Bartholomew, traffic engineeer of the City Planning Commission, made observations for a full week from January 12th to January 18th, during the hours betwen 8 and 12 A. M. and 2 and 6 P. M., on the highway connecting Newark with Jersey City and the ferries to New York. This stretch of about a mile across the level meadows carries a car track in its centre, and one side of this is paved with stone block, the other side with wood block. Two competent experienced assistants took note of each vehicle passing in each direction, noting which pavement it used, its estimated tonnage, its speed, the kind of tire, skidding, slipping, etc. Many drivers were questioned as to their experience and their opinions regarding both kinds of pavement. The weather conditions for the week were such as to make the test quite general, there having been three clear days and four rainy days with fog, frost, and freezing weather. The results of Mr. Bartholomew's test, ne reported as follows:

Of a total of 3,899 vehicles observed, 2,000 were eastbound and 1,899 westbound, showing that the traffic was practically the same in each direction. If the rule of "keep to the right" had been enforced, all eastbound traffic would have used the granite block and all westbound traffic the wood block. This is enforced only on the bridges, however, so that a vehicle bound east which used wood block would do so only of its own desire, while a westbound vehicle, which used granite block, did so because of the same reason; for in either case, it was necessary to cross the car tracks to reach the other pavement.

Of the total vehicles observed, 71.3 per cent. (2,789 vehicles) used the wood block pavement, while 28.6 per cent. (1,110 vehicles) used the granite block pavement. This is to say, approximately seven out of every ten vehicles used wood block. East and west traffic being equal, it is seen that of every ten vehicles five used wood block naturally, three used granite block naturally, while the remaining two deliberately refused granite block to get on the wood block.

Of the total traffic in both directions, 21.2 per cent. (826 vehicles) was rubber tired, practically all of this being of the motor truck variety. Here again east and westbound traffic was the same in each direction, there being 415 vehicles eastbound and 411 vehicles westbound. Of the total rubber-tired traffic, 89.3 per cent. (738 vehicles) used the wood block, while the remaining 10.7 per cent. (88 vehicles) used the granite block. Several vehicles were observed to start off on granite and then change to wood. Taking this into consideration along with an allowance of about ten per cent. using granite through ignorance of a choice, it is evident that all rubber-tired traffic prefers wood block pavement. This statement is substantiated by the fact that less than one per cent. of all rubber-tired traffic used granite block pavement by preference.

Of all the traffic observed, 78.8 per cent. (3,073 vehicles) was iron-tired, most all of this being in the form of two-horse trucks. The east and westbound traffic was in the ratio of sixteen to fifteen or 1,585 vehicles eastbound to 1,488 vehicles westbound. Based upon these figures, percentages will slightly favor granite block pavement. Of all the iron-tired traffic observed, 66.7 per cent. used wood block pavement to 33.3 per cent. on the granite block. Of the eastbound traffic, 49.5 per cent. used granite block to 50.5 per cent. on the wood block, which deliberately refused the granite block. Of the westbound traffic, which would naturally use wood block pavement, sixteen per cent. (238 vehicles) deliberately used granite block in preference to wood block. The remaining eighty-four per cent. (1,250 vehicles) used wood block, and, making a discount of ten per cent. for ignorance of a choice, there remains seventy-four per cent. using wood block apparently through their own volition.

The total tonnage for all vehicles was 15,171.25 tons, or an average of 389 tons per vehicle. Of this total 10,393 tons was on the wood and 4,778.25 tons on the granite.

Since it was observed that 66.7 per cent. of all iron traffic used wood block pavement, it would naturally be implied that this was much preferred to the granite block, but since the ratio varied upon each consecutive day it became evident that there was some apparent reason for such variations. Upon questioning the drivers, it was found that almost all professed granite block to be the best pavement, basing their argument upon the slipperiness of wood block. Yet, most all admitted that wood block was used more because of its "easier riding," both on horses and men.

One driver said granite block, in his estimation, was better than wood block, yet he used the wood block of the Plank road because it had not yet worn smooth. One rainy day showed more vehicles on the granite block, while a similar day showed a larger percentage on the wood block. Not a single instance of skidding or slipping was observed upon either pavement throughout the week. In view of this testimony received and the figures obtained, there is practically little choice between granite block and wood block pavement as regards iron-tired traffic upon the Plank road. The large percentage using wood block, however, would seem to show what little preference there was to be for the wood block.

In considering rubber-tired traffic the figures obtained speak for themselves. Practically ninety per cent. used

wood all the time. Less than one used granite by preference. No skidding was observed and no unfavorable testimony was obtained.

To conclude, since there is a slight preference for wood block by iron-tired traffic and since wood block is preferred almost universally by the rubber-tired traffic, it is the opinion of the writer that wood block is superior to granite block pavement under conditions now extant upon the Plank road.

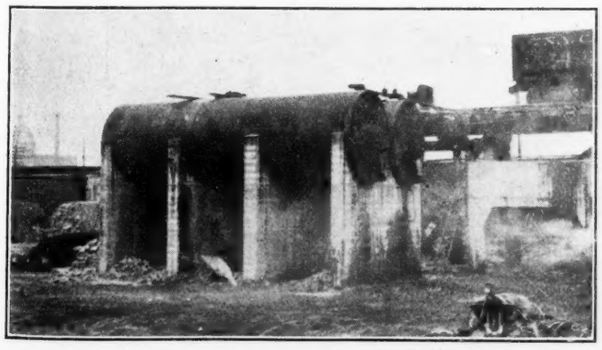
STORING ROAD OIL

Permits Choosing Best Time for Applying.—Eliminates Demurrage and Other Costs.—Description of Tanks Recommended.

It is the common practice with scores, if not hundreds, of cities which are now using oils of various densities for treating macadam and gravel roads, to use this oil directly from the tank car in which it is delivered, which is kept upon a railroad siding for that purpose until it has been emptied. This practice has two disadvantages: one, that it frequently leads to the use of the oil at a time or under conditions which are not adapted to securing the best results; the other, that the city must pay for the time that the tank car is kept out of service and the siding is occupied by it. The railroad generally makes a charge for this, and some oil companies have placed a demurrage or rental charge of $3 or $5 a day on cars in addition to the charge of the railroad. Such a charge would seem to be justified by the fact that this retaining of the cars for several days while they are being emptied may easily reduce the number of loads carried in a season by each car by 50 per cent, which means that the company must carry twice as large an investment in tank cars as would otherwise be necessary. If the company has not made sufficient allowance for this, its loss may be even greater, since it may mean inability to deliver oil contracted for and to realize the profits on the same which they would otherwise have received.

In a paper before the American Association for the Advancement of Science, William H. Kershaw, chief engineer of the Paving and Roads Division of the Texas Company, gave some actual records of cars, showing that the same car shipped to various cities, some of which had and some of which had not tanks for storing oil, showed an average earning capacity varying in one case from 190 gallons per day to 1,600 gallons, twenty-nine days having elapsed between the time the car left the plant and its return in the former case.

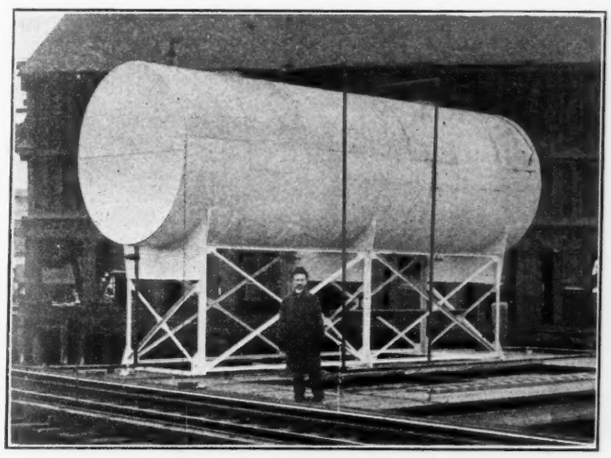
Mr. Kershaw stated that if a direct charge is not made by a company for tank car rental, then the cost of the service, including these delays, must be added by the company to the cost of the oil; and that conversely, if cities generally would provide themselves with oil tanks for storing road oil, the prices of this material would be lowered.



SPRINGFIELD, MASS., ROAD OIL TANKS.

The few municipal storage plants for handling road oil he divided into three classes: First, those so arranged that the oil may be emptied by gravity from tank cars into stationary receiving tanks and drawn from the latter by gravity into distributing wagons. Second, where the receiving tanks are placed beside the track and pumping is employed for raising the oil either from the tank car to the receiving tank, or from the receiving tank to the distributing wagon. Third, where it is necessary to pump both from the car to the receiving tank and from the receiving tank to the wagon. A plant of the first class is found at Springfield, Mass., and is illustrated by the accompanying photograph. This consists of two 10,000-gallon tanks carried on concrete footings or walls. These tanks are so located that there is a fall of 2 feet from the bottom of the tank car as it stands on the track, to the top of the receiving tanks, and a fall of 2 feet from the bottom of the receiving tanks to the top of the distributing wagon. These tanks are single compartment.

A storage plant of the second class is found at St. Louis, Mo., in which the tanks are equipped with steam coils and the piping is steam-jacketed and which will handle road oil, binders and asphalts. Another plant of the second class is found at Greenwich, Conn., in which a 10,000 gallon tank is located on the side of the railroad fill, allowing it to be filled from the tank car by gravity.



TYPE OF TANK RECOMMENDED.

Mr. Kershaw described at some length the kind of plant which he recommended, eight installations of which had been constructed by a contracting concern during 1912. This consists of a tank 8 feet in diameter and 30 feet long with an approximate capacity of 12,000 gallons, an advantage of this size being that oil tank cars have capacities carrying from 4,000 to 12,000 gallons. Steel supports he considers to be fully as efficient as concrete and less expensive, and presents details for such a support consisting of three bents on concrete foundations, each supporting a saddle to receive the tank. Each bent consists of two vertical posts and two diagonal braces and a horizontal brace at the foot, all constructed of angles; each post of the end bents being one 3 x 3 x ⅜ angle, the bottom horizontal brace being the same and the diagonal braces each consisting of one 2½ x 2½ x ¼ angle. Each bent is 5 feet wide and 7 feet high from the top of the concrete foundation to the under side of the tank. To the top of each bent is fastened a saddle composed of a ⅜-in. plate, with its top cut to fit the circumference of the tank, this edge being reinforced by two 3x3x⅜-in. angles bent to the same radius. The middle bent is similar to the two end bents in all respects, except

that each side post is composed of two angles instead of one. The three bents are spaced 12 feet 8½ inches centers and are braced together with two diagonal braces and top and bottom horizontal braces on each side, all of 2½x2½x¼ inch angles.

The tank contains, resting upon its bottom, 16 lines of 2-inch standard wrought iron pipes connected at the ends so as to form a continuous coil extending to within an inch or two of each end of the tank; these being connected with a steam boiler and being used for heating the asphalt. These pipes do not rest directly upon the shell of the tank, but upon three iron rods three-quarters of an inch square and bent to the curvature of the tank shell. The center of the coil is connected to a 2-inch exhaust pipe, through which the steam or condensation water escapes. The presence of the steam coils makes it possible to handle any of the heavier grade binding oils and solid asphalts as well as the light oils. Mr. Kershaw advises the steam coils, even though when the tank is erected it is proposed to use light oil only, since the cost is nominal, steam can generally be obtained from a nearby steam plant or from a steam roller, and an unanticipated use of heavier oils is, therefore, always possible. The coils should be so placed in the tank that one is immediately above and around the opening through which the oil is drawn off, thus preventing any heavy material from blocking up the outlet.

It is recommended that the tank be so set as to have a minimum fall of two inches in 30 feet toward the outlet end of the tank. Steam-jacketed pipe should always be used for the tank connection, thus making it impossible for the discharge pipe to be stopped, even in the coldest weather. A set of connections should be kept at the plant, varying in size from 3 to 6 inches to fit the various makes of tank cars used in road oil service.

A plant such as just described cost, during the summer of 1912, $640 for tank and coils, but not including supports. The steel supports erected cost approximately $150. If the tank is placed near a railroad siding, the cost of piping with steam-jacketed pipes would be under $150. A steam pump with connections costs $50 to $75. The Springfield plant above described cost $688 for the two tanks, and the concrete abutments and piping cost $812, making the total cost for the complete equipment $1,500.

DENVER MUNICIPAL ASPHALT PLANT.

In his report for the year 1912, C. H. Draney, superintendent of paving of Denver, Colo., gives in a brief summary the figures for the work done during that year by the municipal asphalt plant. The plant commenced operations in March, and continued them until December 20th. During this period, the plant turned out 15,891 boxes of surface mixture and 2,103 boxes of binder. The total amount of pavement laid during the year was 82,269.54 square yards, divided as follows:

	Sq. Yds.	Cost	Cost per sq. yd.
General Repairs	50,289	$44,842.65	$.892
Resurfacing Colfax Ave. (south side)	11,560	9,375.69	.81
Resurfacing Cherry Creek Drive	13,120	15,477.40	1.18
Resurfacing 18th Ave..	1,649	2,229.55	1.35
Repairing Cuts	4,258.61	8,517.22	2.00
Repairs for Denver Tramway Co.	1,037.71	1,520.41	1.47
Repairs for Municipal Const. Co.	126.50	126.50	1.00
Repairs for Colorado Co.	228.72	228.72	1.00
Totals	82,269.54	$82,318.14	$1.00

Of the total cost, $42,806 was for general salaries and labor and team payroll; $18,328 was for asphalt, $541 for fluxing oil, $3,263 for coal, $2,651 for cement, $5,888 for sand and gravel, $473 for light and power, $1,254 for crushed granite and basalt, and the balance for such items as office supplies, oil and gasoline, lumber, wood, water rent, lime rock, laboratory equipment, etc. Apparently, nothing is included for interest and depreciation on plant and similar charges.

MUNICIPAL RECORDS.

Among the hundreds of engineers who received the questions which we sent out in preparing the tables published in this issue, a considerable number reported themselves unable to furnish the information; and in a number of such cases we believe that the sending of these questions to them has conferred an indirect benefit in that it will lead to the keeping of better records of municipal work in the future. In fact, several have written to us that these questions have brought home to them the fact that such records should be kept and that next year they hope to be able to answer similar questions should they be asked them. While paving data were lacking in several cases, the records of the sewers are even less complete, although the fact that they are inaccessible after being covered up should suggest the desirability of obtaining and recording all the information possible concerning them while they are exposed to view. One city engineer stated: "The city is well sewered with a combined system, but no records were kept of sizes, grades or the depths. Shortly after I became city engineer the State Health Commission demanded a record and plan of our sewer system, and I was compelled to compile a plan from traditional data—the information I could pry out of present and past city officials. It is needless for me to express an opinion of such state of affairs." The city engineer of a city in New York State writes: "No man living could tell the number of miles of sewers, where they are or their size. The trustees here get a salary of $25 a year, and this is a very good measure of their qualifications. I am employed whenever they have use of such service, but they never move or permit me to unless the public drives them to it."

Few experienced engineers need to be told that such a lack of records is a reflection upon those who are in charge of the construction of these unrecorded structures. We believe there are very few engineers—certainly none deserving the name—who are today constructing sewers or pavements without keeping an accurate record of at least the areas, characteristics and costs of the pavements, and the alignment, depth and size of sewers, location of house connection branches, etc.

There may be some young city engineers, however, to whom a word of warning may not be amiss. Whether required by your employers or not, it is your duty as a technical and professional man to keep a record of all work of which you are in charge, and especially of anything such as sewers or water pipes which are to be buried out of sight. Keep a record of each piece of work, its area or other dimension, in the case of a pavement, exact location and size of sewer or water pipe, and other principal dimensions or features; the price paid, the date constructed; and such other data as experience, common sense or your elders in the profession recommend. Had this duty been hammered home to the engineers of the previous two or three generations the work of many a city engineer of the present day would be much simplified and in many cases the service which he is able to render would be greatly improved.

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MARCH 6, 1913.

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Repairing Asphalt Pavements.

In an article in this issue discussing cost of street maintenance in Trenton, the author calls attention to the fact that in that city a number of the asphalt streets, if not most of them, apparently fail to follow the general law, as stated by certain authorities, that the cost of maintaining such pavements increases with their age. It will be noticed, however, that the record covers but four years, in the middle of which period there was a decided change in the city government. The effect which this change appears to have had upon the maintenance of the streets is very clearly shown by the figures. According to these, the amount spent on the asphalt pavements on 6 of the 8 streets was very much greater the year following the beginning of commission government than during any of the other three years, and in the two remaining cases the second year of commission government saw a considerable increase in such expenditures. This would appear to indicate that the new officials found the asphalt pavements much the worse for neglected repairs, in their opinion, and endeavored to put them in better condition by large expenditures.

In articles in our issues of February 1 and March 14, 1912, we endeavored to show that there was such an increase in the several cities therein considered; but in these cases the increase was not uniform, nor was it continuous in the case of any one street. As Mr. English says, such continuous increase would probably be found only under ideal conditions of maintenance, which would include the repairing of every defect as soon as it became at all prominent. As a matter of fact, in the majority of cities a given street is ordinarily repaired more or less intermittently, no considerable amount of work being done upon it until the holes or other defects become sufficiently numerous to keep the repair gang employed for at least a day in one or two blocks. Where the street is wearing but little, this might mean practically no work for one or two years in succession, and then a general bringing up to standard form. This would give a very zigzag line of repair costs, and yet the general trend of that line would generally be gradually upward.

We believe that if the records of Trenton's asphalt streets are maintained for even five years more, and the streets themselves kept continuously in a fair state of repair, it will be found that the average cost of the streets has been increasing, and that the individual costs of a majority of them also have been increasing.

The following table was derived from the Trenton figures, but gives the percentage of total area which was repaired rather than the yards. This shows that, taking the average of these eight streets, the amount spent in 1910 was somewhat greater than in 1909; but that in 1911 the new government nearly trebled this cost, so greatly improving the condititon of the streets that the cost in 1912 was much less than in either 1909 or 1910.

PERCENTAGES OF TOTAL AREAS OF STREETS WHICH WERE REPAIRED EACH YEAR.

	←Number of Street (as given in article).→								Aver-
Year.	1	2	3	4	5	6	7	8	age.
1909....	1.1	0.1	0.0	13.8	0.9	0.1	1.7	0.2	2.2
1910....	0.8	0.1	3.5	12.6	0.8	0.0	0.5	0.9	2.4
1911....	0.3	0.7	15.6	23.8	3.1	0.3	9.3	0.6	6.7
1912....	1.0	0.1	1.4	4.4	0.4	1.1	1.8	1.4	1.5
Total...	3.2	1.0	20.5	54.6	5.2	1.5	13.3	3.1	12.8

Payment for Street Paving.

Among the items of information collected for this issue was the percentage of the total cost of street paving which was assessed against the property owner or paid by him in other ways, and that paid by the city. Information of this nature was received from 326 cities, with the following results: Sixty-four cities, or 19.5 per cent, reported all the cost of the pavement falling upon the property owner; and 83, or 24½ per cent, reported the property owner as paying for all but the street and alley intersections. In order to avoid complicating the figures, no account has been taken of the statement that paving on the street car right of way is paid for by the street railroad company, since we believe this practice is now almost universal. It also seems probable that in several cases where it was reported that all the cost was paid by the property owners, the informant merely neglected to state that street intersections were not included in this; and we therefore think it quite probable that about one-third of all the cities reporting follow the practice of charging all street paving in front of each property to that property, while the city pays for the street intersections. The indefiniteness of terms employed is indicated by the fact that in certain replies it seems necessary to state that the total costs assessed did not include catch basins or their connections, grading,

or engineering expenses; some of the replies, however, stating that the last named were included in the amount paid by the owners.

In a few states there is a state law controlling this matter. Thus, a law of the state of Ohio requires that in original paving the city pay for all street intersections and at least 2 per cent of the cost of the rest of the pavements; while in repaving, the city must pay for street intersections and 50 per cent of the cost of the rest. We are informed that in Kentucky the law requires that the owner pay for all the original paving.

Aside from the Ohio method, and that of the property owner paying all the cost or all but the street intersections, there seem to be but three methods which are followed by more than 6 towns; 48 towns requiring the owner to pay two-thirds of the cost, 17 towns half of the cost, and 44 paying the entire cost and charging none against the property. Among the other methods, 6 cities charge the owner with two-thirds of the cost excluding street intersections, and the same number charge him with one-third of the cost and an equal number with three-fourths of the cost. In 4 the owner pays between 85 and 95 per cent; in 3 he pays 80 per cent; and there is one case each of the following: $1.50 per front foot; all of the abutting pavement and three-fifths of the intersections; all of the abutting pavement and one-half of the intersections; about 60 per cent; 25 per cent; one-half, excepting street intersections; all of the paving proper and one-half of the grading; the entire cost up to $3 a yard. Two cities reported that the charge in each case was according to the benefits received by the owner, and one that it was determined by the court; these three being probably in the same classification. Two cities stated that the amount paid depended upon the nature of the traffic, the city paying larger amounts where there was general through traffic than where there was little or none of this. Two cities are in doubt as to what method they must adopt, and in one if not both of these the matter is now in the courts for settlement.

As illustrations of apportioning according to benefits: In Dubuque, Ia., the property pays the entire cost, except that the city may contribute a proportion considered equivalent to the benefit which the pavement will be to the entire city rather than to the abutting property. In East Orange, N. J., the amount of payment is determined by an assessment commission according to the benefits received in each case. In Evanston, Ill., the entire cost is assessed on the abutting property on those streets which are not "through traffic" thoroughfares. The greatest amount which has been paid by the city on such thoroughfares has been 40 per cent, the street railway having paid 25 per cent on the same street, leaving 35 per cent to be paid by the property owners.

From the above it appears that in about 60 per cent of the cities the property owner pays all of the cost of paving in front of his property, and in some cases his proportionate share of the street intersections as well; while in only 15 per cent does the city pay the entire cost of paving. As we have frequently stated, neither of these methods seems to be wholly just and fair to the property owner, especially on streets where there is considerable heavy traffic which must be provided for by extensive pavements. We believe, however, that the prevailing reason for this practice is that, were the city required to pay a large proportion of the paving costs, its treasury would not permit the construction of pavements as rapidly as not only the desires but in many cases the almost imperative demands of citizens and traffic call for. Consequently, unless some method of meeting the cost of paving by taxation of all vehicles can be adopted, this is perhaps the best and even an almost necessary method in the majority of cases.

SELECTION OF PAVING MATERIALS.

A variety of paving materials, all of which may be considered more or less standard, are now available for use on city streets, but even more various are the methods employed by the cities of the country in selecting a pavement for a given contract. The information collected by us last month on this subject we have classified under twenty heads, and even then we have neglected certain differentiations. All, however, can be generally combined under four heads, although this condensed classification will overlook many minor points, and possibly in some cases will be actually misleading.

Of the 326 replies received, one-third, or 109, state that decision is made directly by the city council; while in other cities the decision is made by a similar body under another name, such as board of aldermen, selectmen, trustees, city commission, depending upon the form of government. In other cases the decision is made by the board of street commissioners, street committee of council, paving board, street department, highway department, or other committee or board, generally created by the council, which has immediate charge of the streets. In other cases the officer or department which has general charge of all the public works makes this decision, such as the engineer or engineering department, board of public works, board of local improvements, board of control, director of service, etc. This group totals next largest, 25 reporting the board of public works as making this decision, 28 the board of local improvements, 11 the board of control or director of service and 6 the engineering department. In 73 cities it is stated that this decision rests with the owners of the abutting property; although in a considerable percentage of these it was reported that the owners decide by petition, the latter word apparently indicating that this decision is not really final, but rests with the body or official to whom the petition is addressed. On the other hand, a number of our informants state that although the council or committee or department with whom the decision legally rests nominally make this decision, they generally follow the requests of the property owners. One, in a moment of candor, stated that the question in his town was really decided by the agents f the paving contractors.

When we condense the replies as they were stated we find that 47 per cent of them name the council or other controlling body as deciding this question, 22 per cent state that the department of public works, city engineer or some similar official or body make the decision; 8 per cent that it is made by the special paving committee or board, and 23 per cent that it is decided by the owners.

From some of the more characteristic replies we abstract the following:

The laws of Wisconsin provide that a city may advertise for several kinds of pavement, placing the several materials in competition with each other. After the bids are tabulated the city makes them public and the property owners affected have at least five days in which to present a petition for one of the pavements for which bids have been received. A petition of the majority of the owners is mandatory upon the council, except that another material may be selected by a three-fourths vote of that body. The same practice is found in Indiana cities also.

The city engineer of Gary, Ind., reports that in that city the kind of pavement is determined by the board of public works, but their decision may be overruled by the petition of a majority of the resident property owners; and the same practice is reported from Richmond, Ind., also, except that 40 per cent of the owners may overrule the decision of the board.

In Baltimore, Md., the selection is made by the paving commission, of which the city engineer is chief engineer, ex-officio.

In Hoboken, N. J., the committee on streets of the common council make the decision "on recommendation of the engineer or petition of adjoining residents."

In South Omaha, Neb., the property owners have 30 days in which to select a material; if they have not done so by that time the council makes the choice.

DUST LAYING IN BOSTON.

During the year 1912 the city of Boston, Mass., applied to the streets practically the same oil preparation as in 1909, '10 and '11. While other than the Standard Oil preparations were used occasionally, it was found that an oil with 30 per cent. asphalt base gave the best results for streets with a mixed traffic.

The oils chiefly used during 1912 were asphaltic oils, viz., Emulsion road oil, Emulsifying oil, Texaco, Headley XXII and Headley VII, and non-asphaltic oils such as Dustolene, Tascoil and Prime White.

In applying the oils the standard sprinkling carts were used. No water was mixed with the non-asphaltic oils, while the asphaltic oils were mixed with one part oil to three parts water. The non-asphaltic oils were used on quiet residential streets and the results obtained show that their continued use on these streets would be beneficial.

In applying Texaco and Headley XXII and VII, roads with a large amount of automobile traffic were selected. Very satisfactory results were obtained. Roads treated with preparations other than those of the Standard Oil company had a smooth asphaltic surface—the result of oilings given during previous years.

During the season of 1912 in the new district of Hyde Park 536,596 square yards of streets were cared for. Three kinds of oil were used, viz., Standard Emulsion on 409,719 square yards, Dustolene on 74,411 square yards and Tascoil on 52,466 square yards. Beginning June 2nd but three applications were necessary for the Standard Emulsion. Two applications were applied with the Tascoil and Dustolene. These were on residential streets. On the main thoroughfares five treatments of Standard Emulsion were given.

In other sections of Boston, where these non-asphaltic oils were applied they did not stand up so well, especially where there was any steel cutting traffic. In these sections it was necessary to follow the applications with an asphaltic oil.

When the temperature is 32 deg. Fahr. above zero, or below, an application of calcium chloride was made to all surfaces. It is a good dust layer in freezing weather.

During the season 6,949,335 square yards of streets were cared for, receiving an average of seven treatments for the year. The total cost for oiling the streets was $126,904.29 and $0.018 per square yard.

For the above information we are indebted to George H. Foss, supervisor of the Highway Division of the Public Works Department of Boston.

DUST LAYING IN NEW BEDFORD.

In our paving number of June 15, 1910, William F. Williams, city engineer of New Bedford, Mass., described the materials and methods employed in that city for dust laying, dustoline having been used in considerably greater amounts than any other material for this purpose. During 1912, according to C. F. Lawton, superintendent of streets in that city, about twice as much dustoline was used as in 1909, or about 236,000 gallons, this having been used for coating 1,311,474 square yards of road, or 8.97 miles. All of this received one application, and a second application was applied to 37 per cent. of it. Eight per cent. received still a third application, while a fourth was made on a very small area amounting to less than one per cent. of the total treated. The average amount used for the first coat was 0.124 gallons per square yard. The average cost per application was .867-cent per square yard, of which .816-cent was for the material and .051-cent for labor. The average cost per square yard of road for the season from April 1 to December 1 was 1.26 cents per square yard.

PAVING WORK IN 1912.

From Figures Furnished by Officials During the Past Four Weeks.—Amount of Each Kind of Roadway and Sidewalk Paving Laid in 1912 and Contemplated for 1913.—Paving Assessments.

As has been our practice for several years past, we have collected for this number data concerning paving work done throughout the country during the year 1912, and present them in the several tables which appear in this issue. Replies were received from something less than 500 cities, of which about 450 are shown in the tables, a number not appearing because reporting that no work had been done, while several others appear in one or two tables only.

The general indication of these figures is that the amount of paving done in 1912 was somewhat less than that in 1911, although the difference is not very considerable. Perhaps the most interesting comparison between the two years is that between the relative amounts of each class of pavement constructed. In totaling the figures we have combined tables 1 and 3 (the former giving the original paving and the latter giving the resurfacing), since the larger part of the resurfacing was a reconstruction of the entire surface, generally upon the old foundation, thus affording opportunity for changing the class of pavement should this be thought desirable. The totals thus obtained showed the following results:

Sheet asphalt, 17½ per cent. of all the pavement constructed; brick, 24 1-3 per cent.; bituminous concrete and bituminous macadam, each 8.6 per cent.; ordinary water bound macadam, 9.7 per cent. The distinction between bituminous concrete and bituminous macadam was not very distinctly drawn in many cases, although in the blanks asking for the information a definition of each was given, the concrete being defined as "road metal cemented together with a bituminous cement, all the ingredients being mechanically mixed before being laid"; and bituminous macadam being defined as "road of the general nature of macadam, which is protected from surface disturbances by an upper bonding layer of bituminous material." If we combine the two we find that 17 per cent of all the street paving consisted of these bituminous mixtures, and if we include bitulithic, 22 per cent is included in this class.

The amount of other pavements laid was comparatively small, concrete coming next with 6 per cent, stone block with 5 2-3 per cent and wood block with 5½ per cent. The last would have been increased had the figure for Manhattan borough, New York, been available.

The tables show that the bituminous pavements have

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous: Concrete	Bituminous: Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Alabama:														
Gadsden	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds of total cost	Committee.
Montgomery	23,520	....	....	2,591	....	....	....	2,856	....	....	16,826	....	Total area	Board of Commissioners.
Talladega	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	City Commissioners.
Arkansas:														
Fort Smith	....	....	....	106,000	....	35,200	....	....	....	....	....	....	All	Paving Board.
Jonesboro	....	....	....	....	....	....	....	....	....	....	....	....	All	Board of Commissioners.
Little Rock	85,500	....	....	43,500	....	....	....	....	....	78,000	....	....	....	....
Pine Bluff	....	....	....	4,700*	30,000*	16,000*	....	1.0	....	....	....	....	....	Commissioners.
California:														
Fresno	....	....	....	....	....	....	....	60,000*	....	....	....	....	All	Board of Trustees.
Marysville	....	....	....	....	....	....	....	....	37,640*	....	....	13,854*	All but intersections	Property owners.
Oakland	90,507*	....	1,550*	....	....	....	....	....	351,817†*	....	....	....	Generally all	City Council; City Engineer recommends.
Pomona	20,277*	....	....	....	....	578*	....	32,571*	83,913*	37,444*	....	....	All	Property owners.
San Bernardino	6,040*	....	....	....	....	....	....	....	24,160*	....	....	....	All, including engineering	Owners; if approved by Council & City Engineer.
Santa Ana	....	....	....	....	....	....	....	....	10,000†	....	7,000	....	c	Board of Trustees.
Colorado:														
Boulder	....	....	....	....	....	....	....	....	....	1,240*	1.0†	....	All, by imp'v'm't dists d	Property owners d.
Colorado Springs	94,000*	....	....	....	....	....	....	....	5,750†	....	40,000*	....	All, except st. railway	City Council.
Fort Collins	....	....	....	....	....	....	....	....	....	....	....	....	All but about 20 per cent	Property owners.
Grand Junction	....	....	....	....	....	10,000	....	....	8,000	10,000	....	....	All	Property owners' petition.
Connecticut:														
Ansonia	....	....	1,500*	....	....	....	....	....	....	....	....	....	Two-thirds	Board of Aldermen.
Bridgeport	....	....	....	....	12,000	....	....	....	....	....	15,000	....	....	....
Bristol	....	....	....	....	....	....	....	....	....	....	5,280†	....	....	City Council.
Danbury	....	....	2¾	....	....	....	....	....	8	....	....	....	None	Common Council.
Derby	....	....	600*	....	....	....	....	....	7,200*	....	....	....	None	Board of Aldermen.
East Hartford	....	....	....	....	....	....	....	....	....	26,000*	....	....	....	....
Greenwich	....	....	....	....	1,800*	....	18,000*	....	....	....	....	....	One-half	Warden and Burgesses.
Hartford	10,600	....	....	....	....	....	....	....	....	....	....	....	Two-thirds of total cost	Common Council; St. Commissioners recommend.
Manchester	....	....	....	....	....	....	....	....	....	....	....	....	None	Selectmen.
New Britain	400	....	....	....	....	....	32,000	....	....	....	....	....	$1.50 per front foot	Common Council; Bd. Pub. Works recommend.
New Haven	....	....	....	....	....	....	....	....	36,312	....	....	....	Small part; 35c. per front foot for bituminous mac.	Paving Commission.
Plymouth	....	....	....	....	....	....	....	....	....	2.5	....	....	....	....
Torrington	....	....	....	....	....	....	....	....	3,400†	147,400†	176,000†	....	None	Street Committee.
Trinidad	0.5	....	....	2.0	....	....	....	....	1.0	....	....	....	All	Property owners.
Wallingford	....	....	....	....	....	....	....	....	....	....	....	....	None	Paving Committee.
Delaware:														
Wilmington	....	....	5,543	788	....	217	42,953	5,532	893	....	....	345	None	Street Department.
District of Columbia:														
Washington	26,360*	12,679*	....	....	....	2,124*	....	19,000*	75,000†	50,000†	....	....	None	Engineer Department.
Florida:														
Gainesville	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Board of Public Works.
Tallahassee	....	....	....	24,000*	....	....	....	....	....	....	....	....	Two-thirds	City Council.
Georgia:														
Augusta	....	....	15,000	18,000	7,000	1,000	....	....	....	20,000	30,000	....	None	City Engineer.
Griffin	....	....	....	40,000*	....	....	....	....	....	....	....	....	Two-thirds	Mayor, Council, St. Com. and Engineer.
Waycross	....	....	....	5,000*	....	....	....	....	....	....	....	....	Two-thirds	Mayor and Council.
Idaho:														
Boise	....	....	....	....	....	4,000*	....	....	....	....	....	....	All but intersections	Mayor and Council.
Coeur d'Alene	....	....	....	....	....	....	....	....	....	....	....	....	All but intersections	City Council.
Illinois:														
Alton	....	....	....	50,000	....	....	....	....	....	....	....	....	All abutting and 3-5 of intersections	Board of Local Impts.
Beardstown	....	....	....	5,000	....	....	....	....	....	....	....	....	All	Board of Local Impt's and property owner.
Belleville	....	....	....	23*	....	....	....	....	....	....	....	....	All	Board of Local Impts.
Berwyn	....	....	....	....	....	....	....	....	....	29,333*	....	....	....	Board of Local Impts.
Bloomington	....	....	....	8,868	....	....	....	....	....	....	....	....	All except intersections	Board of Local Impts.
Canton	....	....	....	14,894	....	....	....	....	....	....	....	....	75 per cent	Property owners.
Duquoin	....	....	....	37,262*	....	....	....	....	....	....	....	....	All	Board of Local Impts.

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous: Concrete	Bituminous: Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Illinois (Cont).														
Edwardsville	....	....	....	20,000*	....	8,000*	....	....	....	....	....	600*	All except intersections	Board of Local Impts.
Elgin	....	....	....	15,300*	....	....	....	25,439*	....	....	....	....	⅔ to ¾	Board of Local Impts.
Evanston	....	....	....	1.06	....	13,569	....	....	2,419	2,651	....	....	a.	Board of Local Impts. b.
Farmer City	....	....	....	19,500*	....	....	....	....	....	....	....	....	All, if benefited	Board of Local Impts.
Galesburg	....	....	....	9,872*	....	....	....	....	....	....	....	....	....	....
Granite City	....	....	....	9,100*	10,800 c	....	....	....	....	....	....	....	All but st. intersections	Board of Local Impts.
Harrisburg	....	....	....	17,357	....	....	....	....	....	....	....	....	All	Mayor and City Engineer.
Jacksonville	....	....	....	6,300	....	....	....	....	....	....	....	....	All	Board of Local Impts.
Joliet	35,000	....	....	....	5,900	....	....	....	....	6,000	....	....	....	....
Kewanee	....	....	....	....	....	....	....	....	....	....	....	....	Undecided	Property owners.
La Grange	....	....	....	10,000*	....	....	....	....	....	....	....	....	All	Board of Local Impts.
La Salle	....	....	....	20,000*	....	....	....	....	....	....	....	....	85 per cent	Board of Local Impts.
Macomb	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Board of Local Impts.
Mattoon	....	....	....	35,000	....	4,500	....	....	....	....	....	....	All	Board of Local Impts.
Moline	32,355	....	....	40,996	....	....	....	....	....	....	....	....	85-90 per cent.	Board of Local Impts.
Mt. Carmel	....	....	....	....	....	....	....	....	....	....	....	....	Total cost	Board of Local Impts.
Murphysboro	....	....	....	22,000*	....	....	....	....	....	....	....	....	Total cost	Board of Local Impts.
Oak Park	....	....	....	19,043*	....	289*	....	33,971*	....	7,785†*	....	....	All	Board of Local Impts.
Ottawa	....	....	....	....	....	....	....	....	....	....	....	....	All	Property owners.
Pana	....	....	....	33,287*	....	....	....	....	....	....	....	....	All	Board of Local Impts.
Paris	....	....	....	7,800*	....	....	....	....	....	....	....	....	All but st. intersections	Board of Local Impts.
Pekin	....	....	....	47,090	1,092	....	....	12,480	....	3,440	....	....	All but st. intersections	Board of Local Impts.
Pontiac	....	....	....	23,700*	....	....	3,900*	....	....	....	....	....	....	....
Quincy	....	....	....	24,074*	9,171*	18,802*	....	....	....	....	....	....	80-85 per cent	Board of Local Impts.
Rockford	....	....	....	41,204	....	....	....	....	....	31,107	....	....	All but st. intersections	Board of Local Impts.
Springfield	16,886*	....	....	48,280*	....	614*	....	....	....	....	....	....	All but st. intersections	Board of Local Impts.
Spring Valley	....	....	....	29,000*	....	....	....	....	....	....	....	....	87½ per cent	....
Streator	....	....	....	25,000*	....	....	....	....	....	....	2,200†	....	f	Board of Local Impts.
Taylorville	....	....	....	1.5	....	....	....	....	....	....	....	....	All but st. intersections	Board of Local Impts.
Waukegan	....	....	....	3,700	....	....	....	9,960	7,970	....	....	....	Depends on traffic	Board of Local Impts.
Wheaton	....	....	....	....	....	....	....	....	....	24,000	....	....	....	....
Indiana:														
Anderson	....	....	....	812*	....	336*	....	....	....	....	812*	....	All but st. intersections	Board of Public Works.
Argos	....	....	....	22,256	....	....	....	....	....	....	....	....	....	....
Bloomington	....	....	....	17,000*	....	....	....	....	....	6,000	....	....	All but st. intersections	g.
Brazil	....	....	....	5,000	....	....	....	....	....	....	....	....	....	....
Camden	....	....	....	12,200	....	....	....	....	....	....	10,199*	....	About 85 per cent	....
Crawfordsville	....	....	....	10 330*	....	....	....	....	....	....	....	....	....	....
Evansville	58,400	....	....	16,830	....	....	....	....	....	....	....	....	....	....
Ft. Wayne	68,467*	....	....	34,573*	....	....	....	20,373*	1,264*	....	....	....	All but st. intersections	Resident property owners.
Frankfort	....	....	....	22 235	....	....	1,625	....	....	....	....	....	....	....
Gary	....	....	....	63,048*	....	....	....	10,611*	39,538*	17,921*	....	....	All but st. intersections	Board of Public Works h.
Greencastle	....	....	....	....	....	....	....	....	9,600	....	....	....	....	....
Hammond	....	....	....	6,277*	....	....	....	128,423*	107,666*	....	....	....	All but st. intersections	Property owner's petition.
Huntington	....	....	....	....	....	21,500*	....	....	....	....	....	....	All but st. intersections	Majority of pr'p'ty owners.
Indianapolis	138,936*	....	....	17,592*	....	....	....	57,229*	....	....	67,317*	....	All but st. intersections	Property owners.
Kirklin	....	....	....	12,200	....	....	....	....	....	....	....	....	....	....
Kokomo	17,500*	....	....	20,500*	....	....	....	....	....	....	....	....	All but st. intersections	Majority of resident owners.
Lafayette	....	....	....	1,760	....	....	....	....	....	3.5	....	....	All but st. intersections	Board of Public Works.
Lebanon	....	....	....	....	....	....	....	....	11,000	....	....	....	....	....
Logansport	....	....	....	20,895	....	....	....	....	611	....	....	....	....	....
Marion	....	....	....	....	....	....	....	....	....	....	....	....	All	Resident owners.
Michigan City	23,937	....	....	1,122	....	....	....	....	....	....	....	....	....	....
Mishawaka	2,298	....	....	19 102	....	....	....	....	20,320	....	....	....	....	....
Muncie	1.1*	....	....	9.2*	....	....	0.1*	....	....	20.0†	34.0*	....	All but st. intersections	Property owners.
New Castle	8,500	....	....	42,171	....	....	....	....	....	7,500	....	....	....	....
Portland	....	....	....	16,250*	....	....	....	....	....	....	....	....	All but st. intersections	g.
Richmond	....	....	....	0.94*	2,200†	....	....	....	....	2.8†	0.4*	....	Two-thirds of cost	Board of Public Works h.
Shelbyville	....	....	....	....	....	....	....	....	....	....	30,800	....	None	Common Council.
South Bend	53,172	....	....	60,949	....	....	....	....	....	2,913	....	....	....	....
Wabash	....	....	....	....	....	....	....	....	1,320*	3,200*	....	....	All but st. intersections	City Council i.
Wausau	....	....	....	25,611	....	....	....	....	....	....	....	....	....	....
Winchester	....	....	....	20,000	....	....	....	....	....	4,000	....	....	....	....
Iowa:														
Albia	....	....	....	11,000*	....	....	....	....	....	....	....	....	....	....
Boone	15,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Cedar Falls	72,815*	....	....	....	....	27,863*	....	....	....	....	1.0	....	All but one-half street in-tersections	City Council.
Centerville	....	....	....	....	....	3,800*	....	....	....	....	....	....	....	....
Burlington	....	....	....	....	25,000	....	10,000	....	....	....	....	....	....	....
Clarinda	....	....	....	....	....	10,500	....	....	....	....	....	....	....	....
Clinton	....	....	....	14,750*	....	4 700*	....	....	....	....	....	....	All	....
Cedar Falls	72,000	....	....	....	....	29,000	....	....	....	....	....	....	....	....
Cedar Rapids	....	....	....	....	17,050	7,285	....	....	....	....	....	....	....	....
Davenport	18,033*	....	....	46,333*	....	49,843*	....	....	....	....	....	....	....	....

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous Concrete	Bituminous Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Iowa (Cont.):														
Dubuque	....	....	....	13,900*	....	553*	....	....	....	31,822*	....	....	All. j	
Creston	....	....	....	....	....	3,000	50,000	....	....	....	....	....		
Fairfield	....	....	....	15,750*	5,800*	....	....	....	....	....	....	....		
Fort Dodge	....	....	....	15,000	....	....	....	....	....	....	....	....		
Fort Madison	....	....	....	....	....	....	....	....	....	....	....	....		
Iowa City	....	....	....	....	3,000	6,000	6,000	....	....	....	....	....	All	Council.
Manchester	....	....	....	....	....	3,000	9,800	....	....	....	....	....		
Marshalltown	....	....	....	....	....	60,000	....	....	....	....	....	....		
Mason City	....	....	....	....	....	52,000*	....	....	....	....	....	....		
Muscatine	....	....	....	11,000	....	2,000	....	....	....	....	....	....	All but st. intersections	City Council.
New Hampton	....	....	....	....	....	....	10,000	....	....	....	....	....	All but st. intersections	City Council.
Oskaloosa	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	
Sioux City	....	....	....	9,857*	....	170,330*	....	....	10,594*	....	....	....		City Council.
Ottumwa	....	....	....	....	3,000	....	....	....	....	....	....	....	All	City Council and Engineer.
													All, including intersections	City Council.
Kansas:														
Arkansas City	....	....	....	....	....	....	....	....	4,690†	9,400†	....	....	All but st. intersections	Property owners' petition.
Chanute	....	....	....	14,430*	....	....	....	....	....	16,450*	....	....	All but st. intersections	Property owners' petition.
Emporia	....	....	....	17,600*	....	....	....	39,000*	....	....	....	....	All but st. intersections	City Commissioners.
Hutchinson	....	....	....	20,000*	4,000†	....	....	....	....	....	....	....	All but st. intersections	Property owners' petition.
Kansas City	30,026	....	....	14,805	....	45,404	33,029	....	....	....	....	....	All but st. intersections	Property owners' petition.
Manhattan	....	....	....	42,470*	....	3,000*	....	18,495*	....	....	....	....	All but st. intersections	Property owners' petition.
Newton	....	....	....	30,000*	....	10,000*	33,000	....	....	....	....	....	All but st. intersections	Commissioners.
Ottawa	....	....	....	5,557*	....	....	....	....	9,211*	5,458*	....	....		
Rosedale	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners' petition.
Pittsburg	....	....	....	45,713*	....	4,351*	....	....	....	10,079*	....	....	All but st. intersections	Property owners' petition.
Salina	....	17,000	....	....	....	....	....	....	....	....	....	....	All but st. intersections	City Council.
Topeka	....	....	....	70,000*	....	....	....	36,000*	....	....	....	....	All but st. intersections	
Wichita	12,850*	....	....	97,871*	1,511†	39,103*	....	9,839	....	....	....	4,085	All but st. intersections	Property owners' petition.
Kentucky:														
Dayton	....	....	....	4,000*	....	....	....	....	....	3,200*	....	....	All	Council and Mayor.
Hopkinsville	....	....	....	....	....	....	15,000	....	....	25,000	....	....	All but st. intersections	City Council.
Lexington	82,000*	....	....	11,000*	....	....	....	....	....	9,000*	....	....	All but st. intersections	Commissioners and property owners.
Owensboro	....	....	....	....	....	....	....	....	....	....	....	....	None	City Council.
Paducah	....	....	....	....	....	....	....	....	....	....	0.85	....		Council.
Louisiana:														
Alexandria	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Prop'ty owners by petition.
Baton Rouge	....	....	....	....	....	....	85,000*	....	....	....	3.5†	....	Two-thirds, except street intersections	Council and Board Public Works.
Shreveport	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds, except street intersections	Council and citizens.
Maine:														
Bangor	....	....	....	....	....	....	....	....	....	....	....	....	None	City Council.
Portland	....	....	2,428†	....	....	24,905*	....	....	2,262†	....	12,320†	....	None	City Council e.
Rockland	....	....	4,200*	....	....	....	....	2,131*	5,000*	....	7,000	....	Two-thirds for granite	Committee on Streets.
Maryland:														
Baltimore	135,995†*	....	41,930*	73,641*	....	....	....	24,588†*	4,394†	....	....	....	Question in the courts	Paving Commission k.
Massachusetts:														
Boston	2,130	41,338	595	34,225	....	13,371	....	....	63,700	....	....	....		
Brookline	....	....	....	....	....	....	....	....	....	....	....	....	None	Selectmen.
Braintree	....	....	....	....	....	....	....	....	1,180	0.5	0.5	1.0	None	Selectmen.
Cambridge	....	....	4,852	....	26,548	....	14,779	68,122	....	....	....	....	None	Aldermen.
Everett	....	....	5,161	....	....	....	....	....	11,185	705	....	....	None	City Council.
Fall River	....	....	10,550	287	1,888	....	....	....	11,325	28,159	....	....	None	Aldermen.
Haverhill	....	....	....	....	....	....	7,720*	....	....	....	....	....	None	City Council.
Hudson							....	....	....	3.241†	10,529†	4,620†	None	Commission Public Works.
Lawrence	....	....	31,263	....	....	....	....	....	....	....	....	....	None	City Council.
Leominster	....	....	....	....	....	....	....	....	....	....	....	....		Selectmen.
Lowell	....	....	22,418†	....	....	....	....	....	3,662†	13,595†	....	....	None	City Council.
Lynn	....	....	5,617†	....	....	14,088†	....	....	....	....	....	....	None	City Council.
Melrose	....	....	....	....	....	....	....	2,466†	....	....	8,060†	....	None	Aldermen.
Medford	....	....	....	....	....	....	....	....	8,335	....	....	25,516		
New Bedford	....	....	....	2,852	....	....	4,559	....	....	115,675	....	....		
North Adams	....	....	....	....	....	....	....	....	....	....	....	....	One-half	Com. Public Works and Council.
Reading	....	....	....	....	....	....	....	....	....	0.25	0.25	....	None	Selectmen.
Somerville	....	....	2,216*	....	....	8,501†*	....	....	3,623†	....	....	....	One-half original const	Mayor, City Engineer and St. Commission.
Springfield	....	....	....	133	9,506	....	952	....	81,821	18,450	....	....	None	Supervisors.
Webster	....	....	....	....	....	....	....	....	....	2†	1†	....	None	Selectmen.
Woburn	....	....	....	....	....	....	....	....	5,000†	9,075†	10,666†	....	None	Street Commissioners.
Worcester	....	....	33,710†	....	2,872†	7,172*	....	....	29,077†	82,881†	....	....	None	City Council.

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous—Concrete	Bituminous—Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Michigan:														
Alpena	....	....	....	....	....	6,700†	....	....	....	....	....	....	None	City Council.
Benton Harbor	....	....	....	....	....	....	30,000	....	....	....	....	....		
Boyne City	....	....	....	....	....	....	....	....	....	....	0.5†	....		City Council.
Detroit	78,999	....	26,303	64,986	314,347	4,152	....	....	....	4,431	....	....		
Escanaba	....	....	....	....	....	17,000*	....	....	1,059*	....	....	....	All but st. intersections	City Council.
Flint	....	7,786	....	....	....	....	....	....	....	....	....	....		
Grand Rapids	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
Jackson	....	....	....	8,000	....	....	....	14,000	....	....	....	....		
Kalamazoo	....	....	....	10,870*	....	300*	....	22,000*	....	....	....	....	All but st. intersections	City Council.
Monroe	....	1,800*	....	....	....	2,700*	....	....	....	....	....	....	Five-sixths & intersections	Council.
Mt. Clemens	....	21,500*	....	....	....	400*	....	....	....	....	....	....	All but st. intersections	Council.
Muskegon	....	....	....	....	....	....	....	28,405*	....	....	....	....	1	Council.
Niles	....	....	....	3,900*	....	....	....	....	....	....	....	....	All but st. intersections	Council.
Port Huron	....	....	....	....	....	....	....	20,000	....	....	....	....	All but st. intersections	City Commission.
Sault Ste Marie	....	....	....	....	....	....	....	....	....	21,000	....	....		
Minnesota:														
Bemidji	....	....	....	....	....	19,832*	....	....	....	....	....	....	About 60 per cent.	Council.
Chisholm	....	....	....	....	12,435*	....	....	....	....	....	....	....	None	Council.
Duluth	15,864*	....	24,296*	2,655*	9 568*	861*	....	....	....	16,927*	4,173*	....	66 per cent.	Council.
Faribault	....	....	....	....	15,946*	....	....	....	....	....	....	....	All but st. intersections	Council.
Mankato	....	....	....	758*	7,162*	223*	....	....	....	800†	1,960*	....	All but st. intersections	Council.
Minneapolis	....	....	8,030†	43,163†	129,962†	9,851†	....	62,662†	....	....	....	....	All but st. intersections	Council.
Owatonna	....	....	....	....	29,184	....	935	....	....	....	....	....		
Red Wing	....	....	....	....	....	769	....	....	....	....	....	....	All but st. intersections	Council.
St. Cloud	....	....	....	....	....	....	....	....	2,000*	22,000*	....	....	One-half	The Commission.
St. Paul	....	....	....	....	14,246†	3,500†	....	....	....	....	....	....	All	Board of Public Works.
Stillwater	....	....	3,070	9 672	....	485	....	....	....	....	15.0	....	All but st. intersections	Council.
Winona	....	....	....	2,000*	....	....	....	....	....	....	....	....	All but st. intersections	Council.
Mississippi:														
Hattiesburg	....	....	....	....	....	....	....	....	....	....	....	....	None	The Commission.
Vicksburg	....	....	....	7,783*	....	....	....	....	1,333*	....	....	....	One-third	Mayor and Aldermen.
Missouri:														
Brookfield	....	....	....	1.5*	....	....	....	....	....	....	....	....	All	Property owners' petition.
Columbia	....	....	....	21.886	....	3,460	....	....	....	....	....	....	All	City Council.
Fulton	....	....	....	3 082*	....	....	....	....	....	2,276*	....	....	All	Property owners.
Hannibal	....	....	....	8,000	....	60,000	3,000	....	....	....	....	....	All	Property owners.
Kansas City	107,692*	....	13,248*	16,054*	....	266,454*	....	....	29,550*	....	....	....	All	Recommendation of City Engineer.
Lexington	....	....	....	....	....	....	....	....	....	4,000	....	....		
Liberty	....	....	....	2,600	....	38,352	....	....	....	....	....	....		
Mexico	....	....	....	9 807	....	6,466	....	....	....	....	....	....		
Nevada	....	....	....	3,000*	....	7,000†	....	....	....	....	....	....	All	Property owners.
Poplar Bluff	....	....	....	35,000*	....	....	....	....	....	....	....	....	All except engineering	Property owners.
St. Charles	....	....	....	....	....	....	....	....	....	....	....	....	All except grading	Council.
St. Louis	35,162*	....	....	121,859*	81,966*	....	33,484*	....	....	86.111*	....	....	All m	Board of Public Impts.
Sedalia	91,500*	....	....	250 000*	....	2,200*	....	....	....	90,000*	....	....	All	Property owners.
Vandalia	....	....	....	10,654	....	....	....	....	....	....	....	....		
Montana:														
Bozeman	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
Great Falls	....	....	....	....	51,920*	3,061*	8,800*	....	1,850*	....	777†	....	All	Property owners.
Nebraska:														
Grand Island	....	....	....	65,000	....	0.5	....	....	....	....	....	....	All but st. intersections	Property owners.
Hastings	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
Omaha	77,843	....	19,863	71,617	1,309	2,147	....	....	....	728	....	....	All but st. intersections	Property owners.
South Omaha	....	....	....	....	....	....	....	....	....	....	....	....	One-half	Property owners.
York	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
New Hampshire:														
Berlin	....	....	....	....	....	....	....	....	....	15,546†	31,092†	....	None	Street Committee.
Laconia	....	....	....	....	....	....	....	....	....	....	....	....	None	Board of Public Works.
New Jersey:														
Bayonne	58,500*	....	1,200*	2 220*	....	....	....	....	5,520*	....	....	....	All but st. intersections n	Property owners' petition.
Camden	918	....	1,205	2,383	....	....	....	....	....	....	....	....	All	City.
East Orange	....	....	....	....	....	....	24,000*	....	....	....	....	....	According to benefits, o	Council.
Elizabeth	....	....	21,649	41,609	....	....	....	4,219	....	....	....	....		
Hoboken	....	....	....	....	....	....	....	....	....	....	....	....	Only on new streets	Street Committee p.
Irvington	....	....	3,000*	....	....	....	....	....	16 938*	26,574*	....	....	All but st. intersections	Town Council.
Jersey City	3 668	....	46,552	19,740	11,891	....	....	....	3,685	....	....	....		
Long Branch	....	....	....	....	....	....	....	....	....	....	100,000	....	One-half	City Commissioner.

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous—Concrete	Bituminous—Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
New Jersey (Continued):														
Newark q	89†	....	75,735†*	62,626†*	....	....	109,191†*	....	823†	....	....	2,439*	All but st. intersections r.	Board of Public Works.
New Brunswick	....	....	1,200†	800*	....	15,000*	....	18,000*	....	....	....	....	Two-thirds	Common Council.
Passaic	14,187*	....	....	....	....	....	16,411*	9,949*	44,809*	4,047*	....	....	75 per cent.	Commissioners.
Phillipsburg	....	....	....	....	....	....	....	....	....	....	....	....	None	Common Council.
Plainfield w	....	....	....	0.78	....	0.07	....	....	5.50	53.83	....	....	70-85 per cent.	Common Council.
Ridgewood	....	....	1,000†	....	....	....	....	....	....	1,700†	....	....	None	Governing body.
Rutherford	....	....	....	....	....	....	....	....	8,350*	48,675*	....	....	Two-thirds	Property owners' petition.
Trenton	16,327*	....	1,704*	6,148*	....	9,148*	....	25,066*	....	....	....	....	About 70 per cent.	The Commission.
West New York	....	4,870	4,890	2,400	....	....	6,000	....	....	....	....	....	75 per cent.	Property owners.
West Orange	....	....	....	....	....	....	....	....	....	....	....	....	All	Street Committee.
Westfield	....	....	....	....	....	....	....	....	....	31,172*	....	....	About 75 per cent.	Petitioners s.
New York:														
Amsterdam	....	....	....	....	....	....	....	....	....	....	....	....	One-half	Common Council.
Batavia	....	....	....	....	....	....	....	....	1,080†	....	....	....	Two-thirds	Board of Trustees.
Binghamton	....	....	....	31,931*	....	1,594*	....	....	....	....	....	....	One-half	Property owners by petition t.
Corning	....	....	....	....	....	....	....	....	....	....	....	....	One-third	Board of Public Works.
Cortland	....	....	....	....	....	....	....	....	0.5	....	....	....	Two-thirds, except intersections	Board of Public Works.
Elmira	....	....	....	9,199*	....	....	....	....	....	....	....	....	Two thirds	Board of Public Works.
Fulton	....	....	1,207*	37,093*	....	25,339*	....	....	....	....	....	....	Two-thirds, excluding intersections	Property owners.
Herkimer	....	....	....	....	....	....	5,612	....	....	....	....	....	Two-thirds except street intersections	Village Board.
Hudson	....	....	....	....	....	....	....	....	....	....	....	....	None	Comr. of Public Works.
Ilion	....	....	....	....	....	....	23,000*	....	....	....	....	....	Two-thirds	Property owners.
Jamestown	....	13,408†	....	26,217†	....	....	....	....	....	....	....	....	All but intersecting streets	Common Council.
Kingston	....	....	627†	....	....	....	....	....	23,915†	....	....	....	Three-fourths	Common Council.
Little Falls	....	....	....	4,250	....	....	....	....	7,500	8,500	....	....	One-half	Property owners.
Medina w	....	....	....	....	....	....	....	....	....	22.0†	....	5.0	One-half	Board of Trustees.
New York City.														
Brooklyn	421,539*	....	26,333*	....	....	....	....	....	....	4,507*	....	....	....	....
The Bronx	119,137*	69,560*	164,844	....	20,662*	....	....	125,847*	....	....	....	....	All	Highway Department.
Queens	21,000	91,644	24,860	....	19,400	....	....	880,301	111,135	....	....	....	....	....
Richmond	....	....	....	....	....	....	....	....	1,781*	....	....	....	All	Board Pub. Improvements.
Niagara Falls	....	56,619*	....	1,658*	77*	32,261*	12,295*	....	....	....	....	....	All but st. intersections	Property owners.
Norwich	....	....	....	....	....	....	....	....	....	....	....	....	One-third	Property owners' petition.
Ogdensburg	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds, except intersections	Aldermen.
Port Chester	....	8,400*	....	500*	500*	....	....	....	....	....	....	....	One-fourth	Committee and Engineer.
Rochester	24,921	....	42,700	111,873	8,392	....	....	....	7,957	1,620	....	....	All	Property owners.
Schenectady	12,615*	....	....	....	....	....	14,468*	....	....	....	....	....	All but crosswalks	Property owners.
Syracuse	43,982	....	....	4,573	....	....	....	....	....	....	....	....	All	Property owners.
Utica	16,666*	....	1,260*	2,862*	....	....	....	5,842*	....	....	....	....	Two-thirds	Property owners.
Watertown	....	....	....	....	....	10,000	....	....	10,000	30,000	....	....	u	Common Council.
White Plains	....	....	....	9,350*	....	....	....	....	7,800*	....	....	....	....	Board of Trustees.
North Carolina:														
Asheville	....	....	910†	1,307	....	....	....	....	....	....	....	5,024†	Two-thirds	Aldermen.
Goldsboro	....	....	....	....	....	....	....	....	....	....	....	....	One-third	Aldermen.
Greensboro	....	....	....	....	....	25,000*	18,000*	....	12,000*	....	12,000†	....	One-half	Property owners.
Ohio:														
Akron	....	....	4,500	450,000	....	....	2,000	....	....	....	....	....	....	....
Alliance	....	....	....	60,000*	....	....	....	....	....	....	....	....	....	Board of Control.
Ashtabula	....	....	....	5,556*	....	....	....	....	....	....	....	....	....	Property owners' petition.
Bellefontaine	....	....	....	7,200	....	....	....	....	....	....	....	....	....	Council.
Bellevue	....	....	....	13,500	....	....	....	....	4,700	....	....	....	....	Council.
Bowling Green	....	....	....	....	....	....	....	....	19,000*	....	....	....	....	Citizens generally.
Cambridge	....	....	....	8,400*	....	....	....	....	....	....	....	800†	....	City Engineer.
Canton	....	....	....	111,000*	....	....	....	....	....	....	....	....	....	Engineer and City Council.
Chicago Junction	....	....	....	5,500*	....	....	....	....	....	....	....	....	....	Council.
Chillicothe w	....	17,000*	....	149,500*	....	....	....	....	....	....	20.0†	....	98 per cent. except street	....
Cincinnati	38,300*	....	61,876*	47,870*	7,654*	....	....	....	24,097*	4,736*	....	....	intersections	....
Cleveland	....	....	1.3	18.4	....	....	....	....	0.7	....	....	....	....	Council.
Columbus	64,646	....	1,509	222,608	....	....	....	....	....	....	....	....	....	Director of Public Service.
Conneaut	....	....	....	....	....	....	....	....	....	....	....	6,300	....	Board of Public Service.
Dayton	0.16*	....	....	7.07*	....	0.62*	....	....	....	....	....	....	....	Board of Control.
Delaware	....	....	....	14.000*	....	....	....	....	....	....	....	....	....	Board of Control.
Elyria	7,925	....	....	7,375	....	....	....	....	....	....	....	....	....	City Council.
East Liverpool	....	....	....	....	....	....	....	....	....	....	....	....	....	Director of Public Service.
Fostoria	....	....	....	40,000	....	....	....	....	....	....	....	....	....	....
Galion	....	....	....	4.4	....	....	....	....	....	....	....	....	....	Board of Control.

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous Concrete	Bituminous Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Ohio (Continued):														
Greenville	....	....	....	....	....	....	....	....	....	....	5,030	....		Property owners.
Ironton	....	....	....	4,100*	....	....	....	....	....	....	....	....		.....
Hamilton	26,000	....	....	....	....	....	....	....	....	....	7,000	....		Property owners' petition.
Lancaster	....	....	....	30,000*	....	....	....	....	....	....	....	....		City Council.
Lima	....	....	....	3,967*	....	....	....	....	57,043*	....	....	2,800*		Board of Control.
Lorain	4,527	454	....	4,000	....	....	....	14,400	....	....	....	....		Property owners.
Mansfield	....	....	....	855†	....	....	....	....	....	....	....	....		Council.
Marion	9,540*	9,715*	....	6,349*	(1,418*)	....	....	....	....	5,166*	....	....	98 per cent. except street intersections	Board of Control.
Niles	....	....	....	12,000*	....	....	....	....	....	....	....	....		Board of Control.
Norwalk	....	....	....	....	....	3,100*	....	....	....	....	....	....		Council.
Painesville	....	....	....	....	....	....	....	....	....	....	....	....		Director Public Service.
Plymouth	....	....	....	8,000*	....	....	....	....	....	....	....	....		Council.
Ravenna	....	....	....	4.25*	....	....	....	....	....	....	....	....		Board of Control.
St. Mary's	....	....	....	....	....	....	....	....	....	8,000	....	....		Council.
Springfield	....	....	....	....	....	....	....	....	....	25,629	6,580	....		Board of Control.
Steubenville	....	....	1.0*	20,794*	....	....	....	....	....	....	....	....		Council.
Troy	....	....	....	....	....	....	....	....	4,022*	....	....	....	One-half	Council.
Urbana	....	....	....	....	....	....	....	....	0.5*	....	....	....	98 per cent. except street intersections	.....
Warren	....	....	....	....	....	....	....	....	....	....	....	....	98 per cent. except street intersections	Director of Service.
Wellsville	....	....	....	1.0*	....	....	....	....	....	....	....	....	98 per cent. except street intersections	Council.
Wooster	....	....	....	3,705*	....	....	....	....	....	....	....	....	85 per cent. except street intersections	Board of Control.
Youngstown	....	....	....	27,577*	....	....	....	....	....	....	....	....		.....
Zanesville	....	....	....	35,867*	....	....	....	....	....	....	....	....	98 per cent. except street intersections	Council.
Oklahoma:														
Durant	....	....	....	....	....	....	....	6,874*	....	....	....	....	All	Property owners.
Lawton	....	....	....	....	....	....	....	....	....	....	9,955†	25.314*	All	Property owners' petition.
McAlester	....	....	....	....	....	....	....	....	....	3,704*	....	....	All	Property owners.
Oklahoma City	100,000	....	....	....	....	....	....	....	....	....	....	....		.....
Shawnee	1,500	....	....	....	....	....	....	....	....	....	....	....		The Commission.
Tulsa	105,000*	....	....	5,000*	....	....	....	....	....	....	2.0*	....	All	.....
Oregon:														
Astoria	....	....	....	....	....	2,820*	7,008*	....	....	9,000*	....	....	All	City Eng. & St. Committee.
Baker	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	City Commissioners.
Portland	371,364	....	3,914	2,548	....	120,670	160,925	164,862	....	18,000	1,200	19,550	All	City Council.
Pennsylvania:														
Athens	....	....	....	....	....	....	....	....	....	....	7,000	....		.....
Bloomsbury	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Council.
Carbondale	....	....	....	2,200*	....	....	....	....	....	18,700†	....	....	All	Property owners' petition.
Catasauqua	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Town Council.
Chambersburg	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	.....
Connellsville	....	....	....	9,306	....	....	....	....	....	....	....	....	Two-thirds	Borough Council.
Donora	....	....	....	11,730	....	....	....	....	....	....	....	....	All	Borough Council and Eng.
Du Bois	....	8,924	....	79,466	....	....	....	....	....	....	....	....	Two-thirds	Property owner.
Erie	39,054*	....	....	4,686*	....	404*	....	....	....	....	....	....	All but st. intersections	City Council.
Farrell	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Street Committee.
Hanover	....	....	....	14,500*	....	600†	....	....	....	....	....	....	Two-thirds	Borough Council.
Harrisburg	77,871*	....	....	4,074*	....	....	....	....	....	....	....	....	All but st. intersections	City Council.
Hazleton	....	....	....	14,076*	....	....	....	....	780†	3.0†	3.0†	....	Two-thirds	Council.
Homestead	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds v	Property owners.
Kingston	....	....	....	6,000*	....	....	....	....	....	....	....	....	Two-thirds	Council.
Lancaster	....	....	800†	....	....	....	....	....	19,575*	4,681†	....	....	"Whatever they will give"	Property owners.
Lock Haven	....	....	....	....	....	....	....	....	....	....	....	....	None	City Council.
Meadville	....	....	....	0.3*	....	....	....	....	....	....	....	....	All but st. intersections	Property owner.
Monongahela	....	....	....	13,000*	....	....	....	....	....	....	....	....	Two-thirds	Council.
New Castle	....	....	....	10,000	....	....	....	....	....	....	....	....		.....
Norristown	....	....	....	0.6*	....	....	....	....	0.59	....	....	0.15	None	Council.
Northampton	....	....	....	....	....	....	....	....	....	....	....	....	None	Town Council.
Oil City	....	....	....	15,910*	....	590*	....	....	....	....	....	....	All but st. intersections	Council.
Pittsburgh	32,803*	3,000*	115,042*	58,046*	11,567*	....	....	....	....	....	....	....	Determined by court	Department Public Works
Punxsutawney	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Council.
Rankin	....	....	....	70,000*	....	....	....	....	....	....	....	....	Two-thirds	Council.
Reading	32.000	....	....	575	....	....	....	....	....	54,290	....	....		.....
Ridgway	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Borough Council.
Sayre	....	....	....	15,487*	....	....	....	....	....	....	....	....	Two-thirds	City Engineers.
So. Bethlehem	....	....	....	7,000*	....	3,500*	50,000*	7,000*	....	150,000†	....	....	None	Council.
Swissvale	....	....	....	29,787*	....	....	....	....	....	....	....	....	Two-thirds	Council.

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous: Concrete	Bituminous: Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Pennsylvania (Continued):														
Tyrone	....	....	....	1,850*	....	....	....	....	....	....	....	....	One-third	Highway Committee.
Warren	....	....	....	20,000	....	....	....	....	....	....	....	....		
Wilkes-Barre	16,231*	....	2 156*	12,181*	....	....	....	....	....	....	....	....	All but st. intersections	Council.
Wilkinsburg	....	....	....	12,804*	....	....	....	....	....	....	....	....	Two-thirds	Council.
York	11,028*	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
Rhode Island:														
Pawtucket	....	....	550	....	....	....	....	9,367	....	0.06	0.33	....	None	Council.
Woonsocket	....	....	8,511	10,335	2,090	....	11,767	....	....	....	....	1,100	None	
South Carolina:														
Charleston	0.7	....	17.15	5.90	....	....	....	....	....	5.76	5.62	5.70	One-half	Street Committee.
Columbia	....	....	....	24,000	....	....	38,500	....	....	....	....	....	One-half, except street intersections	Council.
South Dakota:														
Mitchell	....	....	....	....	....	26,831	....	....	....	....	....	....	All but st. intersections	Council.
Watertown	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
Tennessee:														
Bristol	....	....	....	....	....	....	....	....	....	1.0†	....	....		
Columbia	....	....	....	....	....	....	....	....	42,128	10,000	....	....		City.
Jackson	....	....	....	....	....	....	....	....	....	....	18,166	60,596		
Knoxville	....	....	....	....	....	....	....	....	8,000*	10,000†	....	....	Two-thirds	Commission.
Texas:														
Abilene	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Commission.
Brownsville	....	....	....	....	28,000*	....	....	....	....	....	....	....	Two-thirds	Council.
Corsicana	....	....	....	....	(17,656*)	....	....	....	....	....	....	....	Three-fourths	Council.
Dallas	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	Commissioners.
El Paso	....	....	....	....	....	....	26,019	....	49,957	....	....	....	All but st. intersections	Property owners.
Greenville	....	....	....	....	....	....	....	....	....	....	....	....	Two-thirds	
Port Arthur	....	....	....	....	....	....	....	....	....	....	....	5.5	Two-thirds	Commissioners.
San Angelo	....	....	....	....	22,000*	....	....	....	....	....	....	....	Two-thirds	Council.
Wichita Falls	....	....	....	....	36,000	....	....	....	....	....	....	....	Two-thirds	Council.
Utah:														
Salt Lake City	23.281*	....	....	....	....	....	8.941*	....	....	....	....	....	All, except half of grading	Property owners' petition.
Vermont:														
Barre	....	....	....	....	....	....	....	....	....	4,620†	4,000†	....	One-half	Council.
Bellows Falls	....	....	1.0	....	....	....	....	....	....	1.0	8.0	....	None	Trustees.
Virginia:														
Danville	....	....	3,500†	14,000†	....	....	....	13,000*	....	....	....	....	None	Council.
Newport News w.	50,000*	37,328*	....	40,581*	....	....	39,475*	....	....	16,000*	1,100†	31,522†	None	City Council.
Norfolk	....	20.000	5,000	13,000	....	....	....	....	2,889	15.870	....	....		
Staunton	....	....	....	....	....	....	....	....	....	....	....	....		
Washington:														
Aberdeen	33,002*	....	....	....	....	11,567*	991*	....	....	....	8,844*	9,638*	All, by improvement dists.	Council.
Seattle	115,866*	....	17,436*	68,751*	....	529*	....	....	....	....	....	....	All, except on thoro'fares	Board of Public Works.
Tacoma	70,371*	....	11,002*	23,834*	....	5,285*	10,335*	....	....	....	....	....		
Walla Walla	....	....	....	....	....	7,487	....	....	....	....	....	13,000		
West Virginia:														
Moundsville	....	....	....	73,360*	....	....	....	....	....	....	....	....	Two-thirds	Council.
Parkersburg	....	....	....	1.5*	....	....	....	....	....	....	....	....	Two-thirds	Council.
Wisconsin:														
Antigo	....	....	....	....	....	....	....	5,000*	....	20,000	....	....	One-half	Property owners' petition.
Appleton	47,851	....	3,120	40,694	34,173	19,947	....	....	....	3.0	6.0	....	All but st. intersections	Council.
Chippewa Falls	....	....	....	....	....	....	....	....	12,060	....	....	....	Two-thirds	Council.
Grand Rapids	....	....	....	....	....	....	....	....	....	46,000	....	....	One-third	City Council.
Eau Claire	....	....	....	....	....	....	....	....	....	....	....	....	All but st. intersections	Council.
Fond du Lac	....	....	....	6,845	....	2,817	....	....	....	....	....	....		
Jefferson	....	....	....	30,807*	....	....	....	....	24,999	3,300	....	....	All	City Council.
Kenosho	26,000*	....	....	31,000*	....	....	....	....	....	....	....	....	All but st. intersections	Property owners.
La Crosse	....	....	....	1,535*	880*	....	....	....	6,467*	9,939*	....	....		Council.
Menasha	....	....	....	....	....	....	....	....	....	....	....	....	One-half	Board Public Works.

(For foot notes see page 345.)

TABLE NO. 1. ORIGINAL PAVING DONE DURING 1912.—(Continued.)

CITY	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block‡	Concrete	Bitulithic	Bituminous Concrete	Bituminous Macadam	Plain or water-bound macadam	Gravel	Other kinds	Proportion of pavement assessed on property owner	Kind of pavement determined by
Wisconsin (Continued):														
Madison	....	....	....	....	....	....	....	....	42,200	....	....	....	All but st. intersections	Board Public Works.
Marinette	....	....	....	....	....	....	....	....	....	20,235	....	....	....	Council.
Neenah	....	....	....	2,784*	....	5,150	....	....	17,387*	....	....	....	Two-thirds	Council.
Oshkosh	8,600*	....	....	....	10,886*x	....	....	....	3,910*	3,528*	....	....	....	Property owners' petition.
Portage	....	....	....	0.5†	....	25,400	....	....	....	10.0†	....	....	....	....
Sheboygan	....	....	....	....	....	27,764*	....	....	....	5,550	....	....	All under $3 per yard	Board Public Works.
Superior	49,816*	....	10,078*	....	....	....	....	....	820*	....	....	....	All	Council.
Waukesha	....	....	....	1,900*	....	....	....	....	31,800*	....	....	....	All but st. intersections	Council.
Canada:														
Edmonton, Alta.	98,780*	....	....	....	....	1,717*	129,350*	....	....	....	....	....	....	....
Lethbridge	....	....	....	....	....	....	....	48,740*	....	....	....	....	One-half	City Council.
Stratford, Ont.	....	....	....	3,500*	....	....	....	....	....	....	....	15,000*	All but st. intersections	Board of Works.
London, Ont.	....	....	....	....	....	....	....	....	....	0.23*	0.46†	....	....	City Engineer.
Vancouver, B. C.	17,807*	....	55,359*	22,692*	189,875*	20,404*	22,682*	156,272*	....	30,172	....	....	All but st. intersections	City Eng. & Bd. of Works.
Windsor, Ont.	....	4,700*	....	....	....	50,000*	....	....	....	....	....	....	One-half	Property owners' petition.

Figures are square yards in most cases, but are miles when decimal figure is given.

a—Entire cost on street with "through traffic." Greatest public benefit assessed was 40 per cent. city, 35 per cent. property, 25 per cent. railroad; this being a through traffic street with cheap property on one side, and on the other a railroad from which practically all local traffic originated. b—Largely governed by desires of property owners, who frequently secure cheap pavements to save cost. c—Asphalt, all except intersections; oil gravel, one-half; gravel, none. d—All resurfacing paid by city and kind determined by street committee and city engineer. e—Recommended by Board of Public Works. f—All but percentage determined by court as benefit to the city. g—Common council decides on four kinds, on which bids are received; resident owners select from these by majority choice. h—Their decision may be overruled by a majority of resident property owners. i—Except in case of a modern pavement, when property owners make petition. j—In some cases city pays part to cover general benefit. k—City engineer is chief engineer of Commission. l—City pays for street intersections and one-fourth of frontage.. m—One-fourth assessed on frontage, three-fourths on district area. n—City also pays for 50 feet frontage for corner lots. o—Determined in each case by assessment commission. p—On recommendation of engineer or petition of owners. q—Figures include renewal, as well as original paving. r—On repaving, percentage determined by assessment commissioners generally. s—Council determines when improvement is instituted by town. t—One-half the owners representing not less than two-fifths of the frontage. u—One-fourth to three-fourths, according to traffic. v—Less cost of grading; all cost on alleys. w—Probably total amount to date. x—7,560 of this was untreated cedar block. ‡Figures in this column in parenthesis are untreated wood block. *—Work done by contract. —†Work done by municipality.

increased from 16½ per cent in 1911 to 22 per cent in 1912, while water-bound macadam has fallen from 14 per cent to 9.7 per cent. Concrete paving has increased from 4¾ per cent to 6 per cent and stone block from 3½ per cent to 5 2-3 per cent.

In the table showing the kinds and amounts of sidewalks built in 1912 there seems to be an overwhelming preponderance of concrete, 92½ per cent of all sidewalk work reported having been of this material. The next largest amount was flagstone pavements, of which there was about 2½ per cent. The amounts of tar concrete, brick, gravel and plank were almost exactly the same, each being a little over seven-tenths of one per cent. The remaining one-half of one per cent comprised small amounts of miscellaneous construction. Another peculiarity noticed was that, outside of the concrete and flagstone pavements, practically all of the sidewalk paving was reported by small towns, only five towns having reported the total amount of other materials laid in 1912 as exceeding 10,000 square yards.

In the construction of curbs and gutters, also, concrete was used in the majority of cases, although the percentages of granite, sandstone and other stone curbing, and of narrow flagstone, cobble and brick gutters were by no means inconsiderable.

The quite common adoption of the combined curb and gutter is shown by the table. In some cities this seems to cost little, and in one city no more than curb alone. The costs of sidewalk, curb and gutter would, of course, be of more value if the thickness, depth and other proportions, concrete mixture, etc., were given.

WOOD BLOCK PAVING.

Some details concerning the construction and cost of wood block pavements in a number of American cities have been collected by the "clearing house" of the American Society of Municipal Improvements, and are given herewith. It is interesting to note that almost half of the cities use 5-in. base. Five-year guarantees are still most common, as is also 20 pounds of preservative; although one-third of these cities specify 16 pounds.

WOOD BLOCK PAVEMENT.

City.	Depth of concrete base, ins.	Length of guarantee, years.	Cost per sq. yd.	Pounds of preservative per cu. ft. of block.	Depth of block, ins.
Birmingham, Ala...	5	5	$2.625	16	3½
Montgomery, Ala...	5	5	2.50	20	3½
Fort Smith, Ark....	..	5	1.70a	16	3½
Little Rock, Ark....	5 & 6	5 & 10	2.75, 2.50 & 2.20	14, 16 & 20	3-4
Augusta, Ga.....	4	10	2.85	20	4
Waukegan, Ill.....	5 or 6	2	2.20 to 2.40	14 or 16	3
Richmond, Ind.....	6	1	2.85	16	4
Bangor, Me.....	6	5	3.59	20	3½
Kansas City, Mo....	6	5	2.95	20	4
Binghamton, N. Y..	6	5	3.03	20b & 22c	3½
Rochester, N. Y....	6	5	3.32	20	3½
Canton, O.....	6	5	2.80	..	..
Cleveland, O.....	6	5	2.97 to 3.21	16 & 20	4
Charleston, S. C....	4 or 5	5	2.72 & 2.87	16	3
Columbia, S. C.....	5	5	2.45	20	3
Austin, Tex.....	5	5	2.325d	20	3
San Angelo, Tex....	5	5	2.56	20	3
Hamilton, Ont., Can.	6	City Work	2.30 to 2.45	20	3

a—Resurfacing only. b—Pine and tamarack. c—Gum. d—Including 9-inch dirt excavation.

In this connection attention might be called to the standard specifications for wood block paving adopted last November by this society. These call for yellow or Norway pine or tamarack. The depth may be 3, 3½ or 4 inches, according to traffic. Twenty pounds of preservative are called for, which preservative shall have a specific gravity of 1.08 to 1.14 at a temperature of 38 deg. C. Specifications are given for both sand cushion and mortar bed. The fall specifications, bound in with the latest standard specifications of the society for brick and sheet asphalt, may be obtained for 25 cents a set from the secretary of the society, 50 Union Square, New York.

TABLE NO. 2. SIDEWALKS, CURBS AND GUTTERS LAID DURING 1912.

City.	Sidewalks			Curbs			Gutters			
	Material.	Sq. yds.	Cost.	Material.	Lin. ft.	Cost.	Material.	Sq. yds.	Lin. ft.	Cost.
Alabama:										
Gadsden	Concrete	8,000	.....	Concrete	4,000	.....	Concrete	.....	4,000	....
Montgomery	Hexagon bl.	4,708a	$1.17	Granite	17,004a	$0.39	Brick	.....	11,205	$0.215
	Schillinger	.....	.99	Concrete	.....	.25	.....	.....	.....	....
Talladega	Concrete	215	.90	Granite	1,474	.50	Concrete	2,307	.....	1.40h
				Concrete	.....	.68	.....	.....	.....	....
Arkansas:										
Fort Smith	Concrete	25,000	.81	Concrete	112,000	.35	.....	.....	.....	....
Jonesboro	Concrete	4,000	.90	Concrete	1,500	.35	Concrete	.....	300	.20
Pine Bluff	Concrete	6,511	.98	Concrete	10,163	.412d	.....	.....	.....	....
California:										
Fresno	Concrete	40,000	....	Concrete	30,000	....	Concrete	8,600	.....	....
Marysville	.....	.....	....	Concrete	2,084	.50	Concrete	.....	11,050	.375
Oakland	Concrete	109,984	.99	Concrete, plain	50,905	.40	Basalt blocks	.....	9,905	.44
				Concrete, protected	9,118	.70	Vit. brick	.....	3,408	.40
				Granite	27,799	1.40	Concrete	.....	79,477	.14
				Redwood	156,597	.11	Grouted stone	.....	15,700	.12
Pomona	Gravel	24,173a	1.00	Concrete	47,153	....	.....	.....	.....	....
San Bernardino	Concrete	36,120	.90	Concrete	26,400	.26	Concrete	13,200	.....	1.26
Santa Ana	Concrete	11,000	.72	Concrete	25,000	.25	Concrete	.....	1,000	.20
Colorado:										
Boulder	Concrete	.....	.90	Concrete	.....	.50	.....	.....	.....	....
Colorado Springs	Concrete	12,000	.14c	Concrete	41,000	.57d	Concrete	.....	41,000	.57d
Fort Collins	Concrete	4,000	.81	Concrete	3,000	.40	Concrete	.....	100	.15
Grand Junction	Concrete	3,000	1.17	Concrete	8,000d	.75d	.....	.....	.....	....
Trinidad	Concrete	8,000	.99	Concrete	7,000	.35	.....	.....	.....	....
Connecticut:										
Ansonia	Tar	.....	.60	Granite	5,000	.75d	Flag or cobble	.....	5,000	....
Bristol	Concrete	7,500	1.44	.....	.....	....	Cobble	.....	5,000	.09
Danbury	Concrete	2,413	1.00	Concrete	8,826	.50	.....	.....	.....	....
Derby	Concrete	1,500a	1.00	Bluestone	2,500	.55	Concrete d	.....	2,500	.70
	Tar	....	.55	.....	....	....	.....	.....	.....	....
East Hartford	Concrete	1,300	1.08	Concrete	300	.35e	.....	.....	.....	....
Greenwich	.....	.....	....	Conc'te, steel nozed	8,471	.80	.....	.....	.....	....
Manchester	.....	.....	....	Granite	.....	.65	.....	.....	.....	....
				Concrete	.....	.40	.....	.....	.....	....
New Britain	Concrete	20,812a	.78	Concrete	46,201a	.40	.....	.....	.....	....
	Bluestone	.....	.98	Bluestone	.....	.60	.....	.....	.....	....
Torrington	.....	.....	....	.....	.....	....	Cobble	.....	3,000	.15
Delaware:										
Wilmington	.....	.....	....	.....	.....	....	.....	.....	21,939	....
District of Columbia:										
Washington	Concrete	66,000	...	Concrete	9,573	.44	Vitrified brick	15,161	.....	1.30
				Granite	83,000	.82	Cobble	5,564	.....	.37
							Concrete	.....	9,573	.35
Florida:										
Gainesville	Concrete	1,000	1.10	Concrete	600d	.50d	.....	.....	.....	....
Tallahassee	Concrete	3,000	1.10	Granite	3,200	.72	.....	.....	.....	....
				Concrete	10,000	.42	.....	.....	.....	....
Georgia:										
Augusta	Concrete	7,000	.85	Granite	18,000	.35	Brick & concrete	.....	22,000	.20
Griffin	.....	.....	....	Granite	14,000	.65	.....	.....	.....	....
Waycross	Concrete	60,000	.85	Granite	1,000	.45	.....	.....	.....	....
Idaho:										
Boise	Concrete	37,866	.53	Concrete	40,054	.26	.....	.....	.....	....
Coeur de Alene	Concrete	48,611	.765	Concrete	6,336	.31	.....	.....	.....	....
Illinois:										
Alton	.....	1,000	....	.....	31,000	....	.....	.....	16,000	....
Belleville	Granite	12,000	1.44	Granite	1,000	.20	Granite	.....	1,000	.20
Berwyn	Concrete	918	....	Concrete	11,560	....	Concrete	.....	11,560	....
Bloomington	.....	29,507	.70	.....	6,118	.50d	.....	.....	.....	....
Canton	Brick	1,550d	.765	.....	.....	....	.....	.....	.....	....
	Concrete	.....	.90	.....	.....	....	.....	.....	.....	....
Edwardsville	Concrete	1,000	1.26	Concrete	21,304	.75d	.....	.....	.....	....
				Limestone	1,351	.60	.....	.....	.....	....
Elgin	.....	16,000	....	.....	6,138	....	.....	.....	6,138	....
Evanston	Concrete	9,170	1.05	.....	.....	....	.....	.....	.....	....
Farmer City	Concrete	200	....	.....	.....	....	.....	.....	.....	....
Granite City	Crushed granite	3,111	1.35	Sandstone	3,300	.60	Concrete	.....	7,050	.95d
Jacksonville	Concrete	2,333	1.17	Concrete	7,563	.60d	.....	.....	.....	....
Kewanee	Concrete	4,000	....	.....	.....	....	.....	.....	.....	....
La Salle	Concrete	3,500a	1.44	Sandstone	10,000a	.49	.....	.....	.....	....
	Brick	.....	....	Concrete	.....	.45	.....	.....	.....	....
Macomb	Concrete	3,000	....	.....	.....	....	.....	.....	.....	....
Moline	Concrete	4,300	.99	Concrete	24,401	.45	Concrete	.....	24,490	.57d
Oak Park	Limest'ne concrete	12,000	.64f	Granite concrete	36,313	.61d	.....	.....	.....	....
Ottawa	Concrete	5,780	1.21	.....	.....	....	.....	.....	.....	....
Pana	.....	.....	....	.....	20,233	....	.....	.....	474	....
Paris	Concrete	1,250	.90	.....	.....	....	.....	.....	.....	....
Quincy	Granitoid	15,827	1.26	Granitoid	4,086	.50d	.....	.....	.....	....
Rockford	.....	24,000	....	.....	3,580	....	.....	.....	20,260d	....
Springfield	.....	.....	....	Sandstone	27,148	.55	Concrete	.....	11,750	.49
Spring Valley	Concrete	3,500	1.26	Concrete	4,000	.37	.....	.....	.....	....
Streator	Brick	2,800	.45	Sandstone	5,000	.50	Concrete	.....	15,000	.60d
	Concrete	7,040	1.08	.....	.....	....	.....	.....	.....	....
Taylorville	Concrete	1,500	.52f	Concrete	9,000	.50d	.....	.....	.....	....
Waukegan	Concrete	2,500	....	.....	.....	....	.....	.....	.....	....
Indiana:										
Anderson	Concrete	6,000	.90	Concrete	2,790	.35	.....	.....	.....	....
Bloomington	Concrete	3,500	1.17	Concrete	5,000	.38	Concrete	.....	2,500	.60d
Crawfordsville	Concrete	5,868	1.16	Concrete	14,495	.38d	.....	.....	.....	....
Elwood	Concrete	6,066	....	.....	.....	....	.....	.....	.....	....
Fort Wayne	Concrete	36,452	1.17	Concrete	.....	....	.....	.....	.....	....
Gary	Concrete	26,278	1.00	Concrete	69,771	.33	.....	.....	.....	....
Hammond	Concrete	34,637	....	Concrete	4,925	....	Concrete	.....	50,820	....
Huntington	Concrete	1,500	.90	Concrete	12,426	.42	.....	.....	.....	....
Indianapolis	Concrete	503,275	.75f	Stratified	121,435	.65	Brick	.....	5,342	1.40h
				Round corner	4,322	1.30	.....	.....	.....	....
Kokomo	Concrete	18,530	.90	Concrete	25,000	.40d	.....	.....	.....	....
Lafayette	.....	3,520	....	.....	.....	....	.....	.....	1,924	....
Muncie	.....	1,555	....	Concrete	15,960d	....	.....	.....	.....	....

(For footnotes see page 350.)

TABLE NO. 2. SIDEWALKS, CURBS AND GUTTERS LAID DURING 1912.—(Continued.)

City.	Sidewalks			Curbs			Gutters			
	Material.	Sq. yds.	Cost.	Material.	Lin. ft.	Cost.	Material.	Sq. yds.	Lin. ft.	Cost.
Indiana (Continued):										
Portland	Concrete	700	....	Concrete	13,800	.425d	.....	.....	.....	....
Richmond	Concrete	20,000	.66	Concrete	21,912	.65d	.....	.....	.....	....
Shelbyville	Concrete	14,000	.90	Concrete	23,000	.50d	.....	.....	.....	....
Wabash	Concrete	4,500	.56f	.....	.....	....	.....	.....	.....	....
Iowa:										
Albia	.....	.....	....	Concrete	7,045	.55d	.....	.....	.....	....
Cedar Falls	Concrete	9,000	.90	Concrete	31,627	.25	Concrete	.....	20,483	.30
Centerville	.....	.....	....	Concrete	2,834	.30	.....	.....	.....	....
Clinton	Concrete	16,000	....	Concrete	2,300	....	.....	.....	.....	....
Davenport	Concrete	7,800	....	.....	.....	....	.....	.....	.....	....
Dubuque	.....	.....	....	Stone	1,316	.70	Concrete	.....	19,348	.65d
Fairfield	.....	.....	....	Concrete	264	.30	Concrete	.....	12,160	.45d
Fort Madison	.....	.....	....	Concrete	14,170	.43	.....	.....	.....	....
Muscatine	.....	5,900	1.00	.....	8,000	.55d	.....	.....	.....	....
Oskaloosa	Concrete	2,000	.95i	.....	.....	....	.....	.....	.....	....
Ottumwa	Concrete	7,500a	.90	.....	.....	....	.....	.....	.....	....
	Brick	.....	.72	.....	.....	....	.....	.....	.....	....
Sioux City	Concrete	5,555	1.08	Concrete	13,391	.72d	.....	.....	.....	....
Kansas:										
Arkansas City	Concrete	6,666	.81	Concrete	10,000	.30	Concrete	.....	10,000	.20
Chanute	.....	.....	....	Concrete	168,391	.47d	.....	.....	.....	....
Emporia	Concrete	880	.99	Concrete	24,000	.45d	.....	.....	.....	....
Hutchinson	Concrete	12,000	.81	Concrete	27,000	.30	Concrete	.....	14,500	.40
Kansas City	Granitoid	9,000	.566f	Granitoid	84,561	.412	.....	.....	.....	....
Manhattan	Concrete	2,500	.81	Concrete	38,390	.43d	Concrete	.....	11,800	.17
Newton	Concrete	17,600	.81	Concrete	30,000	.50	Concrete	8,350	30,100	1.35h
Ottawa	.....	.....	....	Concrete	9,564	.52d	.....	.....	.....	....
Pittsburg	Brick	4,055	.70	Concrete	7,906	.50d	.....	.....	.....	....
Rosedale	Concrete	6,050	1.08	.....	.....	....	.....	.....	.....	....
Salina	Brick	2,000a	.72	Concrete	9,000	.32	Concrete	.....	9,000	.23
	Concrete	.....	.90	.....	.....	....	.....	.....	.....	....
Topeka	Concrete	13,333	.765	Concrete	55,000	.44d	.....	.....	.....	....
Wichita	Concrete	40,000	.35f	Concrete	8,000	.20	Concrete	.....	1,700	.30
Kentucky:										
Dayton	Concrete	800	1.035	Concrete	2,000	.55d	.....	.....	.....	....
Lexington	Concrete	2,000	.64f	Concrete	9,000a	.35	Concrete	.....	70,000	.25
				Granite	.....	1.10	.....	.....	.....	....
Paducah	.....	7,560	.95	Granite	11,220	.76	Concrete	.....	12,000	.24
Louisiana:										
Alexandria	Concrete	1,200	1.35	Concrete	2,000	.48	.....	.....	.....	....
Shreveport	Concrete	.....	.90	Concrete	.....	.34	.....	.....	.....	....
Maine:										
Portland	Brick	1,450	....	.....	.....	....	.....	.....	.....	....
	Concrete	4,406	....	.....	8,397	....	.....	.....	6,908	....
Rockland	Tar concrete	2,580	.75	Granite	875	1.10	.....	.....	.....	....
Maryland:										
Baltimore	.....	.....	....	.....	.....	....	Brick	.....	41,051	2.25h
Massachusetts:										
Braintree	Cinder,, stone dust and gravel	.....	....	.....	.....	....	.....	.....	.....	....
Cambridge	Brick & granolithic	.....	....	Granite	.....	.55	Granite blocks	.....	.....	....
Everett	Granolithic	10,035a	1.857	.....	.....	....	.....	.....	.....	....
	Tar concrete	.....	.663	Granite	5,915	.948	.....	.....	.....	....
Fall River	Granolithic	20,743	1.37	Granite	22,304	....	.....	.....	.....	....
Haverhill	Tar concrete	1,976a	.70	.....	.....	....	.....	.....	.....	....
	Granolithic	.....	1.50	Granite	3,216	.70	Cobble	.....	1,878	.80
Hudson	Concrete	5,598	.40	.....	.....	....	.....	.....	.....	....
	Cinders	.....	.06	.....	.....	....	.....	.....	.....	....
Lawrence	Granolithic	3,830	1.04	Granolithic	1,274	.44	Granolithic	155	.....	1.80h
	Tar concrete	15,731	.45	Granite	30,531	.45	.....	.....	.....	....
Lowell	Concrete	3,500a	.45	Granite	6,000	.20	Cobble	.....	2,000	.25
	Granolithic	.....	1.75	.....	.....	....	.....	.....	.....	....
	Brick	.....	.90	.....	.....	....	.....	.....	.....	....
Lynn	Granolithic	15,493	....	Cement & granite	8,339	....	Cement	.....	500	....
Medford	Tar, brick and granolithic	7,370	....	Granite	9,330	....	Granite blocks	233	.....	....
Melrose	Granolithic	7,779	1.75	Granite	13,056	.80	Granite blocks	1,366	.....	....
	Brick	.....	1.25	.....	.....	....	.....	.....	.....	....
North Adams	Concrete	2,157	.75	Concrete	6,700	.31	Cobble	.....	4,500	....
	Gravel	3,000	....	Granite	3,900	.50	Concrete d	.....	.....	.56
Somerville	Brick	15,545a	1.37	Granite	8,291	1.07	Granite blocks	.....	8,291	2.07h
	Granolithic	.....	1.67	.....	.....	....	.....	.....	.....	....
Springfield	Concrete	4,000	....	Concrete	14,341	....	.....	.....	.....	....
	Brick	1,888	....	.....	.....	....	.....	.....	.....	....
Webster	Concrete	500	.75	Granite	1,100	.55	Cobble	.....	1,100	.50h
Worcester	Granolithic	18,677	1.75	Granite	26,417	.90	Cobble	16,332	.....	1.00
Michigan:										
Alpena	Concrete	4,655	....	.....	.....	....	.....	.....	.....	....
Boyne City	Concrete	1,000	.48f	Concrete	1,660	.26d	.....	.....	.....	....
Escanaba	Concrete	667	.54	Concrete	9,154	.47d	.....	.....	.....	....
Iron Mountain	.....	1,000	.63	Concrete	500	.70d	.....	.....	.....	....
Kalamazoo	.....	.....	....	Concrete	31,086	.40d	.....	.....	.....	....
Monroe	Concrete	4,000	.81	Concrete	20,000	.37	.....	.....	.....	....
Mt. Clemens	.....	.....	....	Concrete	7,000	.50d	.....	.....	.....	....
Muskegon	Concrete	16,888	....	.....	.....	....	.....	.....	.....	....
Niles	Concrete	4,000	.90	Concrete	1,870	.20	.....	.....	.....	....
Port Huron	Concrete	25,000	....	Concrete	15,000	....	Concrete	.....	2,200	....
St. Joseph	Concrete	450	.81	.....	.....	....	.....	.....	.....	....
Minnesota:										
Bemidji	Concrete	1,181	.81	Concrete	200	.25	.....	.....	.....	....
Chisholm	.....	.....	....	Concrete	275d	....	.....	.....	.....	....
Duluth	Concrete	25,000	1.44	Stone	31,686	.90	.....	.....	2,610	.45
	Plank	20,000	....	Concrete	.....	.65d	.....	.....	.....	....
Faribault	.....	897	.85	.....	.....	....	.....	.....	.....	....
Mankato	Concrete	3,510	.81	Concrete	14,191	.57d	.....	.....	.....	....
Minneapolis	Concrete	80,000	.72	Concrete	400,000	.35	.....	.....	.....	....
				Granite	.....	.90	.....	.....	.....	....
New Ulm	Concrete	3,917	.75	.....	.....	....	.....	.....	.....	....
Red Wing	Concrete	1,200	.11f	Concrete	4,000	.30	Concrete	.....	4,000	.25
St. Paul	Tile	8,985a	.80	Concrete	25,613a	.35	.....	.....	.....	....
	Reinf. concrete	.....	1.75	Sandstone	.....	.90	.....	.....	.....	....

(For footnotes see page 350.)

TABLE NO. 2. SIDEWALKS, CURBS AND GUTTERS LAID DURING 1912.—(Continued.)

City.	Sidewalks Material.	Sq. yds.	Cost.	Curbs Material.	Lin. ft.	Cost.	Gutters Material.	Sq. yds.	Lin. ft.	Cost.
Minnesota (Continued):				Granite	.....	1.00	.....	.....	.....	....
Stillwater	Concrete	3,000	.81	Concrete	2,600	.30	Concrete	.....	.....	....
Winona	Concrete	28,000	.80	Concrete	10,000	.26	Stone	.....	650	.38
Mississippi:										
Hattiesburg	Concrete	6,330	1.00	.....	.....	....	.....	.....	.....	....
Vicksburg	Concrete	3,200	.90	Concrete	4,800	.40	Concrete	.....	4,800	....
Missouri:										
Brookfield	Concrete	.....	1.44	Concrete	.....	.32	.....	.....	.....	....
Columbia	Concrete	6,178	1.08	Concrete	11,974	.34	.....	.....	.....	....
Fulton	Concrete	3,000	1.08	Concrete	9,700	.40	.....	.....	.....	....
Hannibal	Concrete	18,710	.44f	Concrete	7,000	.35	Concrete	.....	2,600	.40
Kansas City	Granitoid	111,058	1.16	Granitoid	172,798	.354	Granitoid	.....	60,805	.50
Nevada	Concrete	2,500	.81	Concrete	20,000	.24	Concrete	.....	8,000	.81h
Poplar Bluff	Concrete	5,800	1.35	.....	.....	....	.....	.....	.....	....
St. Charles	Concrete	6,547	1.26	Concrete	10,841	.60d	.....	.....	.....	....
St. Louis	Granitoid	88,760	1.44	Granite	189,446a	.85	.....	.....	.....	....
				Limestone	.....	.75	.....	.....	.....	....
Sedalia	Concrete	13,000	1.08	Concrete	5,280	.33	.....	.....	.....	....
Montana:										
Bozeman	.....	.....	....	Concrete	7,500	.42	.....	.....	.....	....
Great Falls	Concrete	19,740	1.17	Concrete	42,080	.39	.....	.....	.....	....
Nebraska:										
Grand Island	Concrete	2,300	.80	.....	10,000	.30	.....	.....	.....	....
So. Omaha	Concrete	3,173	.93	.....	.....	....	.....	.....	.....	....
York	Concrete	300	1.26	.....	.....	...	.....	.....	.....	...
New Hampshire:										
Berlin	Tar concrete	19,079a	.70	Concrete	5,916	.45	.....	.....	.....	....
	Cement concrete	.....	1.00	.....	.....	....	.....	.....	.....	....
	Crusher screen	....	.08	.....	.....	....	.....	.....	.....	....
Laconia	Tar concrete	1,052	.55	Granite	1,852	.80	Cobble	130	.....	.85
New Jersey:										
Bayonne	Concrete	1,965	....	Concrete	1,400	....	Brick	1,530	.....	....
	Flagstone	1,835	....	Bluestone	27,300	....	.....	.....	.....	....
Hoboken	.....	.....	....	Bluestone	.....	.80	.....	.....	.....	....
Irvington	Bluestone	6,000	1.48	Bluestone	12,000	.75	Vit. brick	5,000	.....	2.30h
Newark	4" Flagstone	793	1.40	Bluestone	159,883	.73	Concrete	.....	11,010d	1.35
	5" Flagstone	7,294	1.59	Granite	22,895	1.07	.....	.....	.....	....
	Concrete	14,468	1.57	.....	.....	....	.....	.....	.....	....
New Brunswick	Concrete	15,000	....	.....	.....	....	.....	.....	.....	....
Passaic	Concrete	3,146	1.26	Concrete	13,800	.35	Concrete	3,146	5,650	1.35h
Phillipsburg	Concrete	1,300a	1.44	Concrete	3,000a	.55	.....	.....	3,000	....
	Stone	.....	1.44	Stone	.....	.55	.....	.....	.....	....
Plainfield	Concrete	.....	1.12	Concrete	.....	.45	.....	.....	.....	....
	Bluestone	.....	1.12	Bluestone	.....	.45	.....	.....	.....	....
Ridgewood	Concrete	.....	1.62	Concrete	.....	.35	Concrete	.....	1,200	....
Rutherford	Concrete	2,000	....	Concrete	8,610	....	Concrete	3,600	.....	....
West New York	Bluestone	1,600	1.53	Bluestone	5,000	.60	Trap blocks	.....	2,200	1.50h
	Concrete	2,000	1.26	Concrete	4,200	1.00d	.....	.....	.....	....
West Orange	.....	.....	....	Concrete	3,600	.46	Belgian block	1,500	.....	1.25
				Bluestone	6,000	.45	.....	.....	.....	....
Westfield	.....	.....	....	Concrete	1,332	.58	Brick	.....	3,075	.90
				Stone	2,275	.65	Concrete	.....	10,606	.85d
New York:										
Batavia	Concrete	3,555	.90	Concrete	5,000	.25	.....	.....	.....	....
Binghamton	Concrete	11,000	.90	Concrete	9,406	.45	Concrete	.....	3,138	.60d
Corning	Concrete	2,718	1.08	Concrete	3,039	.68d	.....	.....	.....	....
Cortland	Concrete	2,000	.90	Concrete	5,000	.50d	.....	.....	.....	....
Elmira	Concrete	10,000a	.50f	Standstone	5,300	.90	.....	.....	.....	....
	Bluestone	.....	.90f	.....	.....	....	.....	.....	.....	....
Fulton	Concrete	2,124	1.08	Concrete	13,219	.60	Concrete	.....	13,000	.60d
Herkimer	.....	.....	....	Sandstone	3,520	....	.....	.....	.....	....
Hudson	Concrete	2,000	....	.....	.....	....	.....	.....	.....	....
Ilion	.....	.....	....	Concrete	14,000	.69d	.....	.....	.....	....
Jamestown	Concrete	17,000	.60f	.....	.....	....	.....	.....	.....	....
Little Falls	Concrete	4,000	1.35	Stone	900	.85	.....	.....	.....	....
New York City:										
Bronx Borough	Flagstone	59,617a	2.34	Bluestone	192,230a	.90	.....	.....	.....	....
Brooklyn Borough	Concrete	.....	1.71	Granite	.....	1.71	.....	.....	.....	....
Manhattan Borough	Concrete	198,863	1.35	Concrete	267,455	.42	Brick	1,239	5,575	2.35
Queens Borough				Bluestone	.....	1.015	.....	.....	.....	....
Richmond Borough	Concrete	11,523	1.62	Concrete	3,256	.70	Brick	23,826	.....	2.30h
Niagara Falls	.....	7,000	....	Sandstone	60,000	.75	.....	.....	.....	....
Norwich	Flagstone	4,000	1.20	.....	.....	....	.....	.....	.....	....
Ogdensburg	Concrete	8,916	1.17	.....	8,000	....	.....	.....	.....	....
Portchester	Concrete	2,000	....	Bluestone	5,500	.70	.....	.....	.....	....
Rochester	Concrete	55,356	....	.....	.....	....	.....	.....	.....	....
Schenectady	Concrete	2,418	.90	Granite	18,132	.82	.....	.....	.....	....
Syracuse	Concrete	16,265	1.05	.....	.....	....	.....	.....	.....	....
Watertown	Concrete	15,000	1.08	Concrete	10,000	.65d	.....	.....	.....	....
White Plains	Concrete	3,500	.85	Concrete	4,000	.95d	Brick	.....	2,250	.60
	Bluestone	300	.90	.....	.....	....	.....	.....	.....	....
North Carolina:										
Asheville	Concrete	27,700	1.25	Concrete	9,340	.17	Concrete	.....	2,516	.17
Goldsboro	.....	.....	....	Granite	2,000	.125	.....	.....	.....	....
Greensboro	Concrete	3,000	1.15	Granite	10,000	.15	.....	.....	.....	....
North Dakota:										
Grand Forks	Concrete	6,000	1.08	.....	.....	....	.....	.....	.....	....
Ohio:										
Alliance	Concrete	4,000a	1.04	.....	.....	....	.....	.....	.....	....
	2" Flagstone	.....	1.26	.....	.....	....	.....	.....	.....	....
Bellefontaine	Concrete	7,000	.85	.....	.....	....	.....	.....	.....	....
Bowling Green	Stone	.....	1.08	Stone	14,400	.44	.....	.....	.....	....
	Concrete	3,000	.90	.....	.....	....	.....	.....	.....	....
Cambridge	Concrete	1,000	1.26	.....	.....	....	.....	.....	.....	....
Canton	Flagstone	20,000	1.35	Stone	36,000	.50	Brick	.....	6,000	.85h
Chillicothe	Concrete	70,000	.72	Concrete	160,000a	.30	Concrete	‡	70,000	.08
				Stone	.....	.55	.....	.....	.....	....
Cincinnati	Concrete	115,156	1.26	.....	.....	....	.....	.....	.....	....
	Plank	13.390j	....	.....	.....	....	.....	.....	.....	....
Cleveland	Concrete	9,500	....	.....	.....	....	.....	.....	.....	....
	Stone	56,600	....	.....	.....	....	.....	.....	.....	....
Columbus	Concrete	17.000g	....	.....	.....	....	.....	.....	.....	....
Conneaut	Concrete	3,700	.81	.....	.....	....	.....	.....	.....	....

(For footnotes see page 350.)

TABLE NO. 2. SIDEWALKS, CURBS AND GUTTERS LAID DURING 1912.—(Continued.)

City.	Sidewalks			Curbs			Gutters			
Ohio (Continued):	Material.	Sq. yds.	Cost.	Material.	Lin. ft.	Cost.	Material.	Sq. yds.	Lin. ft.	Cost.
Delaware	Concrete	.....	.99	.....	.....	....	.....	.....	.....	....
East Liverpool	.....	.....	....	Concrete	5,698	.60d	.....	.....	.....	....
Elyria	2½" Sandstone	.....	1.04	6x25" Sandstone	.....	.53	Concrete	.....	6,630	.60d
Gallion	Stone	3,000	1.08	.....	.....	....	.....	.....	.....	....
Greenville	Concrete	25,000	.90	Concrete	3,320	.45d	.....	.....	.....	....
Hamilton	Concrete	7,000	.81	Concrete	3,000	.50d	.....	.....	.....	....
Ironton	Concrete	17,230	.42	.....	.....	....	.....	.....	.....	....
Lima	Concrete	5,000	1.35	.....	.....	....	.....	.....	.....	....
Lorain	2" Sandstone	5,000	.90	.....	.....	....	.....	.....	.....	....
Mansfield	Flag & concrete	.....	....	.....	.....	....	.....	.....	.....	....
Marion	Sandstone	450	1.42	.....	.....	....	.....	.....	.....	....
Mount Vernon	Concrete	200	.90	Concrete	132	.20	Brick	25	.....	1.50
Newark	Concrete	13,000	.90	Concrete	3,200	.40d	.....	.....	.....	....
Painesville	Concrete	1,400	.90	.....	.....	....	.....	.....	.....	....
Ravenna	Concrete	500	1.35	.....	.....	....	.....	.....	.....	....
St. Marys	Concrete	4,700	.44	.....	.....	....	.....	.....	.....	....
Springfield	Concrete	18,220	.81	Concrete	17,570	.35	.....	.....	.....	....
Steubenville	Concrete	5,116	1.17	Sandstone	722	.55	Concrete	.....	24,242	.55d
Troy	Concrete	11,387	.85	Concrete	16,427	.37d	.....	.....	.....	....
Urbana	Concrete	1,660	.90	Concrete	5,000	.35d	.....	.....	.....	....
Warren	2" Stone	10,000a	1.26	.....	.....	....	.....	.....	.....	....
	Concrete	.....	1.08	.....	.....	....	.....	.....	.....	....
Wellsville	.....	.....	....	Concrete	6,000	.65d	.....	.....	.....	....
Wooster	Flagstone	8,000	.129f	Sandstone	2,632	.20	.....	.....	.....	....
Youngstown	Stone	2,082	1.21	.....	.....	....	.....	.....	.....	....
	Concrete	6,079	.84	.....	.....	....	.....	.....	.....	....
Oklahoma:										
Durant	Concrete	4,611	.90	.....	.....	....	.....	.....	.....	....
Lawton	.....	.....	....	Concrete	16,874	.58	Concrete	.....	22,691	.55
							Concrete d	.....	.....	.70
McAlester	.....	.....	....	Concrete	5,000	.55d	.....	.....	.....	....
Tulsa	Concrete	7,000	.90	.....	.....	....	.....	.....	.....	....
Oregon										
Astoria	Concrete	4,660	1.35	Concrete	10,620	.36	Concrete	.....	5,500	.28
Baker	Concrete	2,330	.81	.....	.....	....	.....	.....	.....	....
Portland	Concrete	520,000	.83	Concrete	731,661	.31	Concrete	21,205	.....	....
Pennsylvania										
Athens	Concrete	500	.90	.....	.....	....	.....	.....	.....	....
Bloomsbury	.....	.....	....	Concrete	1,200	....	Brick	.....	1,200	....
Carbondale	.....	5,800	....	.....	1,000	....	.....	.....	.....	....
Catasauqua	Concrete	700	.90	Concrete	1,560	.50	Concrete	.....	3,406	.20
Connellsville	Concrete	1,600	....	.....	2,000	....	.....	.....	.....	....
Donora	.....	.....	....	Stone	7,000	.52	.....	.....	.....	....
Du Bois	Concrete	.....	....	Concrete	.....	.35	Concrete	.....	.....	.60d
Edwardsville	Concrete	1,500	1.13	.....	.....	....	.....	.....	.....	....
Erie	.....	.....	....	Concrete	12.775	.37	.....	.....	.....	....
Farrell	Stone	725	1.26	Stone	1.300	.55	.....	.....	.....	....
Gallitzin	Concrete	300	1.26	Concrete	600	....	.....	.....	.....	....
Harrisburg	.....	.....	....	Granite	66.000a	.80	.....	.....	.....	....
				Granolithic	.....	.40	.....	.....	.....	....
Meadville	Concrete	9,000	1.17	Stone	3.000	.60	Concrete	.....	360	.55
Monongehela	.....	.....	....	.....	4.300	.48	.....	.....	.....	....
Norristown	.....	.....	....	Concrete	.....	.42	Vit. brick	.....	5,739	.35
Northampton	Concrete	1,000	.99	Concrete	1,200	.50d	.....	.....	.....	....
Oil City	Concrete	1,742	1.39	Concrete	15.474	.52d	.....	.....	.....	....
Pittsburg	Concrete	22,279	1.35	Sandstone	119.109	.75	.....	.....	.....	....
				Prot. concrete	36.802	90	.....	.....	.....	....
				Concrete	8.325	.67	.....	.....	.....	....
Punxsutawney	.....	.....	....	Concrete	6.000a	.50	.....	.....	.....	....
				Stone	.....	.60	.....	.....	.....	....
Rankin	Concrete	1,000a	1.45	Stone	1,800	.65	Concrete	.....	1,700	.70d
	Brick	.....	.90	.....	.....	....	.....	.....	.....	....
Sayre	Concrete	1,500	.90	Concrete	7.320	.47d	.....	.....	.....	....
Swissvale	.....	1,850	....	Concrete	16.443	.61	.....	.....	.....	....
Titusville	Concrete	12,000	.99	.....	.....	....	.....	.....	.....	....
Warren	Concrete	.....	1.35	.....	.....	....	.....	.....	.....	....
Wilkes Barre	.....	5,694	....	.....	22.214	....	.....	.....	.....	....
York	Concrete	62,000	.90	Concrete	21.120	.25	Concrete	.....	10,500	1.08h
Rhode Island										
Pawtucket	.....	.....	....	.....	8.324	....	.....	2,775	.....	....
Woonsocket	Tar concrete	1,000	.45	.....	3.565	.50	Cobblestone	1,700	.....	.40
South Carolina										
Charleston	Concrete	1,386	.89	Granite	4,560	.28	.....	.....	.....	....
Columbia	Concrete	24,000	1.25	Concrete	24.800a	.30	.....	.....	.....	....
				Granite	.....	.60	.....	.....	.....	....
South Dakota										
Mitchell	Concrete	4,590	.90	Concrete	6.685	.32	.....	.....	.....	....
Watertown	Concrete	1,800	.81	Concrete	2.000	.30	.....	.....	.....	....
Tennessee										
Columbia	Concrete	10,630	1.35	Concrete	650	.50	.....	.....	.....	....
Jackson	Concrete	1,000	....	.....	.....	....	.....	.....	.....	....
Knoxville	Concrete	17,952	.85	Concrete	7.890	.60d	.....	.....	.....	....
Texas										
Abilene	Concrete	5,000	1.00	Concrete	5.000	.35	.....	.....	.....	....
Brownsville	Concrete	35,000	1.44	Concrete	75.000	.50	.....	.....	.....	....
Corsicana	Brick	2,500a	.30	Cres. plank	4.000	.18	Brick	.....	450	.18
	Concrete	.....	.60	Concrete	.....	.45	Concrete	.....	.....	.20
Dallas	Concrete	95,792	1.08	Concrete	145.847	.40	Concrete	.....	90,196	.35
El Paso	.....	14.818	....	.....	22.228	....	.....	.....	.....	....
Greenville	Concrete	44,440	1.17	.....	.....	....	.....	.....	.....	....
Port Arthur	Concrete	15,300	1.22	Concrete	27.000	.42	.....	.....	.....	....
San Angelo	Concrete	8,000	1.17	Concrete	10,000	.30	.....	.....	.....	....
Sulphur Springs	Concrete	4,000	....	.....	.....	....	.....	.....	.....	....
Wichita Falls	Concrete	3,000	1.12	Concrete	2.000	.25	.....	.....	.....	....
Utah										
Salt Lake City	Concrete	50,000	.99	Concrete	54.549	.40	Concrete	.....	53,601	.50
Vermont										
Barre	Granolithic	1,195	1.08	.....	1.108	....	.....	.....	.....	....
Bellows Falls	Concrete	350	1.50	Granite	166	.85	Cobble	.....	500	.85

(For footnotes see page 350.)

TABLE NO. 2. SIDEWALKS, CURBS AND GUTTERS LAID DURING 1912.—(Continued.)

City.	Sidewalks Material.	Sq. yds.	Cost.	Curbs Material.	Lin. ft.	Cost.	Gutters Material.	Sq. yds.	Lin. ft.	Cost.
Virginia										
Danville	Granolithic	12,700	.87	Granite	4.000	....	.....	1,800	.....	....
Newport News	Concrete	10,000	1.10	Concrete	11,900	.45d	.....	.....	.....	....
Staunton	Concrete	2,801	....	.....	.....	....	.....	.....	.....	....
Washington										
Seattle	Concrete	124,822	1.00	Concrete	480.796a	.30	.....	.....	.....	....
				Granite	.....	1.75	.....	.....	.....	....
				Wood	.....	.15	.....	.....	.....	....
				Armored Conc.	.....	.55	.....	.....	.....	....
Aberdeen	Concrete	6,247	1.02	Concrete	10.421	.34	Wood	.....	8,526	....
	Wood	4,815	.43	Armored Conc.	7,272	.66	.....	.....	.....	....
				Wood	8.526	....	.....	.....	.....	....
Tacoma	Concrete	25,000	.55	.....	.....	....	.....	.....	.....	....
West Virginia										
Moundsville	Concrete	2,666	1.30	.....	.....	....	.....	.....	.....	....
Parkersburg	Concrete	50,000	1.08	Concrete	10,000	.30	.....	.....	.....	....
Wisconsin										
Antigo	Concrete	6,000	.99	Concrete	3,600	.50d	.....	.....	.....	....
Appleton	Concrete	19,961	.94	Concrete	1,800	.40	.....	.....	.....	....
Chippewa Falls	Concrete	.....	.72	Concrete	4,940	.50d	Concrete	.....	2.460	.23
Eau Claire	Concrete	3,000	....	Concrete	6,936	.19	Concrete	700	.....	.75
							Brick	1,040	.....	1.36
Kenosha	Concrete	6,000	1.10	Concrete	18,000	.58	.....	.....	.....	....
La Crosse	Concrete	7,000	.72	Concrete	10,515	.50	.....	.....	.....	....
Menasha	Concrete	8,500	.90	.....	.....	....	.....	.....	.....	....
Merrill	Gravel	9,000	....	.....	.....	....	.....	.....	.....	....
Neenah	.....	.....	....	Concrete	8,877	.40d	.....	.....	.....	....
Oshkosh	Concrete	.....	1.08	Protected concrete	.....	....	Concrete	.....	.....	.50d
Portage	Concrete	2,000	.90	.....	.....	....	.....	.....	.....	....
Sheboygan	Concrete	8,000	....	Concrete	13,750	.50d	.....	.....	.....	....
Superior	Concrete	28,077	1.06	Concrete	8,500	.43	.....	.....	.....	....
Waukesha	.....	.....	....	Concrete	22,000	.39d	.....	.....	.....	....
Canada										
Lethbridge, Alta.	Concrete	28,278	1.49	Concrete	32,163	.45d	.....	.....	.....	....
London, Ont.	.....	60,000	.85	Concrete	30,795	.31d	.....	.....	.....	....
Stratford, Ont.	Concrete	5,250	.50	Concrete	12,200	.36d	.....	.....	.....	....
Vancouver, B. C.	Concrete	125,000	1.06	Concrete	85,271	.50	.....	.....	.....	....
Windsor, Ont.	Concrete	26,343	.85	Concrete	18,000	.30	.....	.....	.....	....

a—includes all kinds named. b—Per cubic yard. c—For 6-inch walks; 8¼ cents for 4-inch walks. d—Curb and gutter combined. e—15 cents additional for steel nozing. f—Per lineal foot. g—Does not include work done by private parties. h—Per square yard. i—For 4-inch concrete; $1.80 for 5-inch reinforced concrete. j—Lineal feet.

TABLE NO. 3. RESURFACING DONE DURING 1912.

City.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous Concrete.	Bituminous Macadam.	Plain or water-bound Macadam.	Gravel.	Other kinds.
Alabama:												
Talladega	16,481C	....	....	....	....	....	....	....	....	....	....	....
Arkansas:												
Fort Smith	....	....	....	2,500	35,000	....	....	.....	....	40,000	....	....
Pine Bluff	....	....	....	....	....	....	....	25,500C	....	....	....	....
California:												
Oakland	5,184C	.....	....	....	....	....	....	....	....	....	....	....
San Bernardino	....	48,320M	....	....	....	....	....	....	....	....	....	....
Colorado:												
Boulder	....	....	....	....	....	....	....	....	....	....	1.0	....
Connecticut:												
Danbury	....	....	....	....	....	....	....	....	26,791	....	....	....
Hartford	19,900	....	....	....	....	....	....	....	.....	.....	....	....
New Britain	16,078C	....	....	....	....	....	....	....	11,945C	57,213M	....	....
Wallingford	....	....	....	....	....	....	....	....	23,000	....	....	....
Dist. of Columbia:												
Washington	81,145C	102,625	....	....	....	....	....	....	....	....	....	....
Illinois:												
Bellville	....	....	....	40,000C	1,000C	....	....	....	....	....	....	....
Evanston	....	....	....	21,104	....	....	....	....	....	....	....	....
Harvey	....	....	....	30,000	....	....	....	....	....	....	....	....
Jacksonville	....	....	....	58,000	....	....	....	....	....	....	....	....
Oak Park	....	....	....	.....	....	....	....	734C	....	1,133M	....	....
Taylorville	....	....	....	40,000C	....	....	....	....	....	....	....	....
Indiana:												
Bloomington	....	....	....	.....	....	....	....	....	....	5,000M	....	....
Geary	....	....	....	20,443	....	.....	....	....	....	....	....	....
Huntington	....	....	....	....	....	21,500C	....	....	....	....	....	....
Iowa:												
Sioux City	....	....	....	....	....	....	....	10,594	....	....	....	....
Kansas:												
Hutchinson	....	....	....	30,000C	....	....	....	....	....	....	....	....
Kansas City	4,700	....	....	....	....	....	....	....	....	....	....	....
Wichita	1,689C	....	....	....	....	....	....	....	....	....	....	....
Maine:												
Bangor	....	....	....	....	1,400C	....	....	....	....	....	.....	....
Rockland	....	....	....	....	....	....	....	....	....	....	11,000M	....
Massachusetts:												
Brookline	....	....	10,700	....	....	....	....	....	....	....	....	....
Fall River	....	....	700	....	....	....	.....	....	.....	....	.....	....
Haverhill	....	....	....	....	....	....	7,720C	....	24,189M	....	24,800M	....
Hudson	.....	....	....	....	....	....	....	....	....	3,241M	10,529M	4,620M
Lowell	2,500M	....	....	.....	....	....	....	....	....	27,757M	10,000M	....
North Adams	....	....	....	10,110C	....	1,940C	....	....	....	9,400M	70,000M	....
Somerville	....	....	....	....	....	....	.....	....	19,386M	....	....	....
Springfield	194	....	....	....	....	....	1,766	....	17,274	....	....	....

(For footnotes see page 351.)

TABLE NO. 3. RESURFACING DONE DURING 1912.—(Continued.)

City.	Sheet asphalt	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous Concrete.	Bituminous Macadam.	Plain or water-bound Macadam.	Gravel.	Other kinds.
Michigan:												
Grand Rapids	....	....	....	45,350	....	....	....	13,300	....	3,140	34,340	5,200
Muskegon	....	....	....	....	....	....	....	2,400C	....	....	....	....
Port Huron	....	....	....	....	....	9,000C	....	....	16,000M	....	....	....
Minnesota:												
St. Paul	19,428M	....	....	....	14,246M	3,500M	....	....	....	....	....	....
Missouri:												
Kansas City	10,300M	....	11,000C	38,416C	3,012C	....	....	....	....	....	....	....
Sedalia	....	....	....	17,540	....	....	....	....	....	....	....	....
Nebraska:												
Omaha	8,103	....	....	6,500	1,309	2,150	....	....	....	....	....	....
New Hampshire:												
Laconia	....	....	....	....	....	....	....	1,001M	4,096M	....	....	....
New Jersey:												
Bayonne	12,830	....	....	....	....	....	....	....	....	....	....	....
East Orange	....	....	....	....	....	....	24,000	....	....	....	....	....
Hoboken	1,328C	2,500C	1,847C	....	....	....	15,908C	....	....	....	....	....
Long Branch	....	....	....	....	....	....	3,000	....	....	....	....	....
Newark a	....	....	....	....	....	....	....	....	....	....	....	....
New Brunswick	....	....	....	800	....	....	....	....	....	....	....	....
Phillipsburg	....	....	....	....	....	....	....	....	b	5,000	....	....
Ridgewood	....	....	....	....	....	....	....	....	48,000	....	....	....
Rutherford	....	....	....	....	....	....	....	....	....	12,169C	....	....
Trenton	....	....	3,970C	11,547C	....	....	....	13,766C	....	....	....	....
West Orange	....	....	....	....	....	....	....	....	....	2,400	....	....
Westfield	....	....	....	....	....	....	....	....	....	6,066C	....	....
New York:												
Brooklyn Borough	523,027C	64,153C	102,620C	....	59,080C	....	....	....	....	....	....	18,943C
Bronx Borough	9,222C	25,111C	100,088C	....	....	....	....	....	....	203,406	....	....
Queens Borough c.	....	....	....	....	....	....	....	....	....	....	....	....
Richmond Borough	....	....	5,210C	1,905C	7,790C	3,992C	....	83,434C	100,283MC	76,333M	15,612M	....
Elmira	3,310M	10,132C	....	....	....	....	....	....	....	....	....	....
Amsterdam	....	....	....	....	....	....	....	....	25,000	4,500	....	....
Norwich	....	....	....	....	....	....	1.5	....	....	....	....	....
Ogdensburg	....	....	....	6,000C	....	....	....	....	....	12,000M	....	....
Port Chester	....	....	....	....	....	....	....	....	35,000	....	....	....
Rochester	32,607C	....	24,025C	12,807C	3,243C	....	....	....	8,156C	....	....	....
Schenectady	10,265C	....	....	....	....	....	....	....	....	....	....	....
Syracuse	1.5C	....	....	....	....	....	....	....	....	....	....	....
Utica	7,772	9,544	....	....	....	....	....	....	....	....	....	....
White Plains	....	....	....	....	2,000M	....	....	731C	....	....	....	....
Ohio:												
Canton	....	....	....	31,000	....	....	....	....	....	....	....	....
Columbus	14,272	....	....	....	....	....	....	....	....	....	....	....
East Liverpool	....	....	....	15,339C	....	....	....	....	....	....	....	....
Elyria	....	....	....	3,320	....	....	....	....	....	....	....	....
Galion	....	....	....	24,325	....	....	....	11,000	....	....	....	....
Lima	....	....	....	....	....	....	....	....	700M	....	....	....
Lorain	....	....	....	....	....	....	29,600	....	....	....	....	....
Marion	14,798C	10,662C	....	4,548C	....	....	....	....	....	....	....	....
Youngstown†	....	1,388C	....	....	....	....	....	....	....	....	....	....
Oklahoma:												
Durant	....	....	....	....	....	....	....	....	200	....	....	....
Oregon:												
Portland	....	....	....	....	....	....	14,240C	....	....	....	....	....
Pennsylvania:												
Carbondale	....	....	....	3,000C	....	....	....	....	....	....	....	....
Catasauqua	....	....	....	....	....	....	....	6,116C	....	....	....	....
Erie	711C	....	....	2,325C	....	....	....	....	....	....	....	....
Lancaster	....	....	....	2,200C	....	....	....	....	....	....	....	....
Northampton	....	....	....	....	....	....	....	....	68,530M	....	....	....
Oil City	3,343C	....	....	1,143C	....	....	....	....	....	....	....	....
Pittsburgh	25,853	....	45,699	5,320	5,333	....	....	....	....	....	....	....
Punxsutawney	....	....	....	8,000C	....	....	....	....	....	....	....	....
Wilkes Barre	7,852C	....	....	3,711C	....	....	....	....	....	....	....	....
York	2,000M	....	....	....	....	....	....	....	....	....	....	....
South Carolina:												
Charleston	....	....	....	....	9,000C	....	....	....	....	....	....	....
Tennessee:												
Jackson	....	....	....	....	....	....	....	....	....	....	41,600	....
Texas:												
Dallas	....	....	....	2,875C	92,659C	....	87,399C	....	32,550C	....	....	....
West Virginia:												
Moundsville	....	....	....	8,500C	....	....	....	....	....	....	....	....
Wisconsin:												
Appleton	....	....	....	....	....	7,332	....	....	....	....	3.0	....
Chippewa Falls	....	....	....	....	....	....	....	....	150	....	....	....
Eau Claire	....	....	....	1,164MC	....	....	....	....	1,592M	12,165M	11,700M	....
Grand Rapids	....	....	....	....	....	....	....	....	5,000M	....	....	....
Canada:												
London, Ont	....	....	....	....	....	....	....	....	....	....	....	1,829M
Stratford, Ont	....	....	....	....	....	....	....	....	....	17,300	....	....
Vancouver, B. C.	....	....	....	....	11,373C	....	....	....	....	....	....	....
Windsor, Ont	....	4,700	....	....	....	....	....	....	....	....	....	....

C—Work done by contract.. M—Work done by municipality. a—66,000 square yards of old pavement renewed; details not furnished. b—20,000 gallons of Tarvia B used. c—26,183 square yards of sheet asphalt and 991,436 of macadam and gravel replaced by pavements not specified.

TABLE NO. 4. WORK CONTEMPLATED FOR 1913.

City	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block	Concrete	Bitulithic	Bituminous: Concrete	Bituminous: Macadam	Plain or water-bound macadam	Gravel	Other kinds
Alabama:												
Gadsden	....	....	....	....	....	....	....	....	....	....	....	19,000 b
Talladega	12,000*	....	....	....	....	....	....	....	....	....	16,300*	....
Arkansas:												
Fort Smith	....	....	....	22,000 a	12,000 a	....	40,000	....	....	12,000	....	....
Jonesboro	....	....	....	....	....	....	....	....	2.0	....	....	....
Pine Bluff	....	....	....	....	17,000	....	....	55,000	....	....	....	....
California:												
Fresno	50,000	....	....	....	....	....	....	....	....	....	....	....
Marysville	....	....	....	....	....	....	....	....	20,000	....	....	....
Oakland	115,000	....	....	....	....	....	....	....	350,000	....	....	....
San Bernardino	....	....	....	....	....	....	....	....	120,800*	....	....	....
Santa Ana	13,200	....	....	....	....	....	....	....	15,000	....	10,000	....
Colorado:												
Boulder	....	....	....	....	....	....	....	....	4,367*	....	....	....
Fort Collins	....	....	....	....	....	....	....	....	....	....	21,000	....
Grand Junction	....	....	....	....	....	8,000	....	....	25,000	....	....	....
Connecticut:												
Ansonia	....	....	4,000	....	3,500	....	....	....	....	....	....	....
Bristol	....	....	....	10,560 b	....	....	....	....	....	....	....	....
Derby	....	....	600	....	....	....	....	....	....	....	....	....
East Hartford	....	....	....	....	....	....	....	....	12,000*	....	....	....
Hartford	24,320	....	1,700	....	....	....	....	....	....	....	....	....
New Britain	20,000	....	....	....	....	....	....	....	....	4.0	....	....
Torrington	....	....	....	....	....	....	....	....	0.5	0.5	1.0	....
Wallingford	....	....	4,250 a	4,250 a	4,800 a	7,500	....	4,800 a	....	....	....	....
District of Columbia:												
Washington	100,000	115,000	....	....	....	2,000	....	19,000	75,000	50,000	....	....
Florida:												
Tallahassee	....	....	....	50,000	....	....	....	....	....	....	....	....
Georgia:												
Waycross	....	6,000	....	....	....	....	....	....	....	....	....	10,000 b
Idaho:												
Boise	....	....	....	....	....	....	....	....	....	....	....	75,000 b
Coeur d'Alene	....	....	....	....	....	....	20,000	....	....	....	....	....
Illinois:												
Alton	....	....	....	50,000	....	....	....	....	....	....	....	....
Belleville	....	....	....	130,000*	....	....	....	....	....	....	....	....
Bloomington	....	....	....	55,272	....	....	....	....	....	....	....	....
Canton	....	....	....	3,000	....	....	....	....	....	....	....	....
Du Quoin	....	....	....	40,460	....	....	....	....	....	....	....	....
Edwardsville	....	....	....	6,600	....	1,000	....	....	....	....	....	....
Elgin	....	....	....	31,880	....	....	....	11,335	50,000	....	....	....
Evanston	....	....	....	....	....	....	....	....	4,600	....	....	....
Farmer City	....	....	....	17,000*	....	....	....	....	....	....	....	....
Galesburg	....	....	....	66,861*	....	....	....	....	....	....	....	....
Granite City	....	....	....	....	....	....	....	....	14,930	....	....	....
Harrisburg	....	....	....	70,000	....	....	....	....	....	....	....	....
Harvey	....	....	....	33,000	....	....	....	12,000	....	....	....	....
Kewanee	....	....	....	....	....	....	....	15,000	....	....	....	....
Macomb	....	....	....	1,000	....	....	....	....	....	....	....	....
Mattoon	....	....	....	30,000	....	....	....	....	....	....	....	....
Moline	10,000	....	....	50,000	30,000	....	....	....	....	....	....	....
Mt. Carmel	....	....	....	60,000	....	....	....	....	....	....	....	....
Murphysboro	....	....	....	20,000	....	....	....	....	....	....	....	....
Oak Park	41,000	....	....	15,390	....	....	....	144,665	....	....	....	....
Ottawa	....	....	....	190,000	....	....	....	....	12,000	....	....	
Paris	....	....	....	5,000	....	....	....	....	....	....	....	....
Pekin	....	....	....	70,000	....	....	....	....	....	....	....	....
Quincy	....	....	....	13,297	15,741	....	....	....	30,368	....	....	....
Rockford	....	....	....	42,000	....	....	....	....	....	....	....	....
Springfield	....	....	....	59 345	14,400	....	....	....	....	....	....	....
Spring Valley	....	....	....	22,000*	....	....	....	....	....	....	....	....
Streator	....	....	....	10 000	....	....	....	....	....	....	....	....
Taylorville	....	....	....	50,000*	....	....	....	5,000*	....	....	....	....
Waukegan	....	....	1,850*	29,000*	4,600* c	....	....	8,600*	....	....	....	....
Indiana:												
Bloomington	....	....	....	20,000*	....	....	....	....	....	6,000*	....	....
Crawfordsville	....	....	....	1,675	....	....	....	....	....	....	652	....
Hartford City	....	....	....	10 000	....	....	....	....	....	....	....	....
Huntington	....	....	....	....	....	....	d	....	....	....	....	....
Indianapolis	140,000*	....	....	18,000*	....	....	....	55,000*	....	....	67,000*	....
Kokomo	10,000*	....	....	6,000*	....	....	....	....	6,000*	....	....	....
Lafayette	....	....	....	....	....	....	....	....	....	80,000†	....	....
Muncie	33,000	....	....	....	....	....	....	....	....	....	....	....
Portland	....	....	....	10,000	....	....	....	....	....	....	....	....
Richmond	....	....	....	16,200*	....	....	....	....	....	4,000†	2,000*	....
Iowa:												
Clinton	....	....	....	....	....	....	....	....	....	....	....	82,200 b
Dubuque	....	....	....	21,000	34,000	....	....	....	10,000	30,000	....	....
Fairfield	....	....	....	0.25	....	....	....	....	....	....	....	....
Fort Madison	....	....	....	22,500	....	....	....	....	....	....	....	....
Muscatine	....	....	....	1.0	....	0.5	1.0	0.5	....	....	1.0	....
Oskaloosa	....	....	....	1.0	....	....	....	....	....	....	....	....
Ottumwa	....	....	....	18,000	....	....	....	....	....	....	....	....
Sioux City	....	....	....	20,000*	....	300,000*	....	15,000*	....	....	....	....
Kansas:												
Arkansas City	....	....	....	....	....	....	....	....	....	....	....	19,000
Chanute	....	....	....	....	....	6,000*	....	....	....	....	....	....
Emporia	....	....	....	8,800*	....	....	....	20,000*	....	....	....	....
Manhattan	....	....	....	20,000*	....	6,000*	....	10,000*	....	....	....	....
Newton	....	....	....	....	....	....	....	....	....	....	....	35,000 b
Ottawa	....	....	....	5,000	....	....	....	....	6,500	....	....	....
Rosedale	....	....	....	....	....	....	41,200	....	....	....	....	16 000
Salina	....	15.000	....	....	....	....	....	....	....	....	....	....
Topeka	....	....	....	45,000*	....	....	....	60,000*	....	....	....	....
Wichita	0.5	....	....	1.0	....	....	....	....	1.5	....	....	....
Kentucky:												
Dayton	....	....	....	17,000*	....	....	....	....	2,000*	4,000*	....	....
Hopkinsville	....	....	....	....	....	....	....	30,000	20,000	....	....	....
Lexington	75,000*	....	....	....	....	....	....	9,000*	....	....	....	....
Owensboro	30,000*	....	....	....	....	....	....	15,000†	....	....	....	....

(For footnotes see page 354.)

TABLE NO. 4. WORK CONTEMPLATED FOR 1913.—(Continued.)

City	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block	Concrete	Bitulithic	Bituminous: Concrete	Bituminous: Macadam	Plain or water-bound macadam	Gravel	Other kinds
Louisiana:												
Shreveport	45,000	....	....	....	....	....	....	....	....	....	24.0	....
Maine:												
Rockland	....	....	....	....	....	....	....	5,500	....	....	....	....
Maryland:												
Roland Park	....	....	....	....	....	40,200	....	....	44,373	....	....	....
Massachusetts:												
Braintree	....	....	....	....	....	....	....	....	....	0.5	....	....
Everett	....	....	....	....	....	....	....	....	....	....	....	$50,000 b
Hudson	....	....	....	....	....	....	....	....	....	3,300	17,600	....
Lawrence	....	....	20,753	....	....	....	....	....	....	....	....	....
Lynn	....	....	15,265	....	....	45,650	....	....	....	....	....	....
North Adams	....	....	....	d	....	d	....	....	....	d	d	....
Woburn	....	....	....	....	....	....	....	....	....	9,075	9,075	....
Michigan:												
Alpena	....	....	....	....	....	10,000†	....	....	....	....	....	....
Escanaba	....	....	....	....	....	11,000*	....	....	....	....	....	....
Kalamazoo	....	....	....	5,000	....	....	....	20,000	....	....	....	....
Mt. Clemens	....	....	....	....	....	....	....	....	....	....	....	10,000 b
Muskegon	....	....	....	....	....	....	....	14,000*	....	....	....	....
Niles	....	....	....	10,000	....	....	....	....	....	....	....	....
Port Huron	....	....	....	....	....	....	....	1.0	....	....	....	....
Minnesota:												
Duluth	1.0	....	0.5	2.0	0.5	....	....	....	....	2.0	2.0	....
Faribault	....	....	....	....	11.700*	....	....	....	....	....	....	....
Mankato	....	....	....	....	d	....	....	d	d	....	....	....
Minneapolis	....	....	10,000	20,000	150,000	20,000	....	40,000	....	....	....	....
St. Cloud	....	....	....	....	....	....	....	6 000	14,000	....	....	....
St. Paul	90,000	....	....	....	....	....	....	80,000	....	....	....	....
Winona	....	....	....	23,000	12,500	....	....	....	....	....	....	....
Mississippi:												
Vicksburg	....	....	....	20,500	....	....	....	....	....	....	....	....
Missouri:												
Columbia	....	....	....	5,622	....	17,882	....	....	....	....	....	....
Fulton	....	....	....	1,713*	....	....	....	....	....	....	....	....
Kansas City	115,000	....	20,000	65,000	....	250,000	....	....	25,000	....	....	....
Poplar Bluff	....	....	....	30,000	....	....	....	....	....	....	....	....
St. Louis	4.0	....	....	7.0	2.0	....	2.0	....	....	5.0	....	....
Sedalia	....	....	....	25,000*	....	5,000*	....	....	10,000*	....	....	....
Montana:												
Bozeman	....	....	....	....	....	....	45,000	....	....	....	....	....
Nebraska:												
Omaha	90,000	....	....	125,000	....	35,000	....	....	....	....	....	....
South Omaha	....	....	....	81.720	....	8,234	....	32,000	....	....	....	....
New Hampshire:												
Laconia	10,000	....	....	....	....	....	....	....	15,000	....	....	....
New Jersey:												
Bayonne	55,000	....	....	4,000	....	....	....	....	....	....	....	....
Camden	....	....	....	....	....	....	....	....	....	....	....	10,000 b
Irvington	....	....	....	18,000	....	....	....	....	....	5,000	....	....
Jersey City	1,800	....	16,000	....	....	....	....	....	....	....	....	....
Long Branch	....	....	....	45,000	....	....	65.000	....	....	....	200,000	....
Newark	22,000	11,000	85,000	42,000	....	....	42,000	....	....	....	....	....
New Brunswick	....	....	....	35,000	....	....	....	....	....	....	....	....
Passaic	15,000*	....	....	....	....	....	....	....	....	....	....	....
Plainfield	....	....	....	d	....	d	....	....	....	2,25	....	....
Ridgewood	....	....	....	3,300	....	....	....	....	72,000	29,000	....	....
Rutherford	....	....	....	35,000*	....	....	....	....	....	27,000*	....	....
Trenton	12,000	....	....	9,000	....	2,500	....	50,000	....	....	....	8.0
West New York	....	7,000	....	7.000	....	....	10,000	....	....	....	....	....
Westfield	....	....	....	....	....	20,000*	....	....	....	25,000*	....	....
New York:												
Amsterdam	....	....	....	12,000	....	....	....	....	8,000	4,500	....	....
Batavia	....	....	....	50,000	....	....	....	....	....	....	....	....
Binghamton	....	....	....	11,000	....	5,000	12,000	....	....	....	....	....
Corning	....	....	....	14,500	....	....	....	....	....	....	....	....
Cortland	....	....	....	....	....	1,500	....	....	0.8	....	....	....
Elmira	1,765	....	....	29,200	....	....	....	....	....	....	....	....
Fulton	....	....	2,000*	40,000*	....	18,400*	....	....	....	....	....	....
Herkimer	....	....	....	....	....	....	8,597	....	....	....	....	....
Hudson	....	....	....	15,000	....	....	....	84,000	....	....	....	....
Ilion	....	....	....	....	....	....	25,000	....	....	....	....	....
Jamestown	....	5,000	....	25.000	....	....	....	....	....	....	....	....
Kingston	....	....	....	5,800†	....	....	....	....	....	....	....	....
Little Falls	....	....	....	5 000	....	....	....	....	6,000	6,000	....	10,000
Medina	....	....	....	50,000	....	....	....	....	....	....	....	....
New York:												
Brooklyn Borough	950,000	60,000	130,000	....	60,000	....	....	....	....	4,000	....	20 000
Richmond Borough	....	1,450	19,530	6,200	55,950	....	....	178,800	27,300	13,815	....	....
Niagara Falls	....	30,000	....	....	....	30,000	30,000	....	....	....	....	....
Ogdensburg	....	....	....	70.154*	....	....	....	....	....	....	....	....
Port Chester	....	8,800*	....	2,000*	....	....	10,000*	....	....	....	....	....
Schenectady	100,000	....	....	6,000	....	....	....	....	....	....	....	....
Syracuse	90,800	....	....	32.770	....	....	....	....	13,950	....	....	....
Utica	20,000	16,000	1,000	3,000	....	....	....	....	....	....	....	....
Watertown	....	....	....	10,000	7,500	5.000	....	....	15,000	22,000	....	....
White Plains	....	....	....	3,000†	....	....	....	....	....	....	....	....
North Carolina:												
Asheville	....	....	....	1,800†	....	....	....	....	....	....	....	....
Goldsboro	....	....	....	....	....	....	....	....	....	....	....	16,000 b
Greensboro	....	....	....	....	....	20,000	10,000	....	....	....	....	....
Ohio:												
Alliance	....	....	....	70,000*	....	....	....	....	....	....	....	....
Ashtabula	....	....	....	23.650*	....	....	....	....	....	....	....	....
Bellevue	....	....	....	12,000	....	....	....	....	....	....	....	....
Bowling Green	....	....	....	6,400*	....	....	....	....	7,000*	....	....	....
Cambridge	....	....	....	22 000	....	....	....	....	....	....	....	....
Canton	....	....	....	121,000	....	....	....	....	....	....	....	....
Conneaut	....	....	....	13,600	....	....	....	....	....	....	....	3,200

(For footnotes see page 354.)

TABLE NO. 4. WORK CONTEMPLATED FOR 1913.—(Continued.)

City	Sheet asphalt	Asphalt block	Granite, sandstone or other stone block	Brick or clay block	Creosoted wood block	Concrete	Bitulithic	Bituminous: Concrete	Bituminous: Macadam	Plain or water-bound macadam	Gravel	Other kinds
Ohio (Continued):												
Dayton	....	....	....	7.0	3.0	2.0	....	....	....	....	....	....
Delaware	....	....	....	7,000	....	....	....	....	....	....	....	....
East Liverpool	....	....	....	20,000*	....	....	....	....	....	....	....	....
Elyria	....	....	....	....	....	....	....	....	....	....	....	57,600 b
Galion	....	....	....	14,000	....	....	....	6,000	....	....	....	....
Greenville	....	....	....	1 030	....	....	....	....	....	....	....	....
Hamilton	60,000	....	....	....	....	....	....	....	....	....	....	....
Lancaster	....	....	....	33,000*	....	....	....	....	....	....	....	....
Lima	....	....	....	14,018*	1,850*	....	....	....	2,090*	....	....	....
Lorain	....	....	....	1,300	....	....	40,000	....	....	....	....	....
Mansfield	....	....	....	18,000	....	....	....	....	....	....	....	....
Marion	7,000	....	....	7,000	....	3,500	....	....	....	....	....	....
Newark	....	....	....	91,000	....	....	....	....	....	....	....	....
New London	....	....	....	9,300	....	....	....	....	....	....	....	....
Niles	....	....	....	50 000*	....	....	....	....	....	....	....	....
Norwalk	....	....	....	17 700	....	7,500	....	....	....	....	....	....
Painesville	....	....	....	30,000	....	....	....	....	....	....	....	....
Ravenna	....	....	....	10,500	....	....	....	....	....	....	....	....
St. Marys	....	....	....	30,000	....	....	....	....	....	....	....	....
Springfield	205,460 a	....	205 460 a	205,460 a	....	....	....	....	....	....	....	....
Steubenville	....	....	....	15,000	....	....	....	....	....	....	....	....
Troy	....	....	....	....	....	....	....	....	26,700*	....	....	....
Warren	....	....	....	20,000*	8,300*	....	....	....	....	....	....	....
Wellsville	....	....	....	1.0	....	....	....	....	....	....	....	....
Wooster	....	....	....	38,763*	....	....	....	902*	....	....	....	....
Youngstown	....	0.1	....	12.7	....	....	....	....	....	....	....	....
Zanesville	....	....	....	47,823*	....	....	....	....	....	....	....	....
Oklahoma:												
Durant	....	....	....	....	....	....	....	18,000*	....	....	....	....
Lawton	....	....	....	....	....	....	....	....	....	....	....	40,933*
McAlester	....	....	....	....	....	....	....	592	....	....	....	....
Tulsa	50,000	....	....	....	....	....	....	....	....	....	....	....
Oregon:												
Astoria	....	....	....	....	....	2,200*	16,000*	....	....	....	....	....
Portland	....	....	....	....	....	....	....	....	....	....	....	50.0 b
Pennsylvania:												
Catasauqua	....	....	....	....	....	....	....	8,000	....	....	....	....
Chambersburg	....	....	....	....	....	....	....	....	....	....	....	15,000 b
Connellsville	....	....	....	0.7	....	....	....	....	....	....	....	....
DuBois	....	....	....	7,000	....	....	....	....	....	....	....	....
Erie	75,000	....	....	5,000	....	....	....	....	....	....	....	....
Farrell	....	....	....	28 000†	....	....	....	....	....	....	....	48,000 b
Hanover	....	....	....	....	....	....	....	....	....	....	....	....
Harrisburg	66,624	....	....	....	....	....	....	....	....	....	....	....
Homestead	....	....	....	1,150	....	....	....	....	....	....	....	....
Kingston	....	....	....	6,000	....	....	....	....	....	....	....	....
Meadville	....	....	....	65,000	....	....	....	....	....	....	....	....
Monongahela	....	....	....	24,000	....	....	....	....	....	....	....	....
Norristown	....	....	....	d	....	d	....	d	d	d	....	d
Northampton	....	....	....	....	....	....	....	5,000†	7,600†	....	....	....
Oil City	5,200 a	....	....	32,000	5,200 a	400	....	....	....	....	....	....
Pittsburgh	50,000	3,000	165,000	65 000	12,000	....	....	....	....	....	....	....
Punxsutawney	....	....	....	12 000*	....	....	....	....	....	....	....	....
Rankin	....	....	....	5,800*	....	....	....	....	....	....	....	....
Ridgway	....	....	....	11,000	....	....	....	....	....	....	....	....
South Bethlehem	....	....	....	....	....	....	....	30,000	....	....	....	....
Warren	....	....	....	10,000	....	....	....	....	....	....	....	....
Wilkinsburg	....	....	....	15,000*	....	....	....	....	....	....	....	....
York	150 000	....	....	....	....	....	....	....	....	....	....	....
Rhode Island:												
Pawtucket	....	....	....	....	....	....	....	....	d	d	d	....
Woonsocket	....	....	3,500	....	....	....	....	....	....	....	....	....
South Carolina:												
Charleston	....	....	....	....	....	....	....	....	....	....	....	$100,000 b
Columbia	30,000*	....	....	3,550	....	....	....	....	....	....	....	....
South Dakota:												
Watertown	....	....	....	....	....	46,000*	....	....	....	....	....	....
Texas:												
Abilene	75,000	....	....	....	....	....	....	....	....	....	....	....
Brownsville	....	....	....	....	8,000*	....	....	....	....	....	....	....
Corsicana	....	....	....	....	....	....	....	....	....	....	....	28,000 b
Dallas	....	....	....	....	5.0	....	6.0	....	3.0	....	....	....
El Paso	....	....	....	....	....	....	99,733	....	80,434	....	....	....
Greenville	....	....	....	95,000	....	....	....	25,000	....	....	....	....
Port Arthur	25,000	....	....	....	....	....	....	....	....	....	....	....
Utah:												
Salt Lake City	91,156	....	....	....	....	....	....	....	....	....	....	....
Vermont:												
Bellows Falls	....	....	....	....	....	....	....	....	....	0.5†	1.0†	....
Virginia:												
Suffolk	....	....	....	4,500	....	....	....	....	3,500	....	....	....
Washington:												
Aberdeen	70 400	....	....	....	....	11,700	....	17,600	....	....	6,000	19,000
Seattle	184,280	....	5,319	92,377	....	....	....	....	....	....	....	....
Tacoma	150,000	....	....	20,000	12,000	....	....	....	....	....	....	....
Wisconsin:												
Antigo	....	....	....	....	....	....	....	12,000	....	....	....	....
Appleton	....	....	....	9,000	....	22,000	....	....	....	....	....	....
Chippewa Falls	....	....	....	....	....	....	....	4,000	7,600	....	....	....
Eau Claire	....	....	....	2,000	2,000	....	....	....	7,000	....	....	....
Jefferson	....	....	....	5.000	....	....	....	....	65,000	....	....	....
Kenosha	60,000	....	....	50,000	....	....	....	....	....	....	....	....
Madison	....	....	....	....	....	....	....	30,000	....	....	....	....
Menasha	....	....	....	....	....	....	....	8,000	....	....	....	....
Oshkosh	....	....	....	2.100	....	30,000	....	4,300	7,258	....	....	....
Sheboygan	....	....	....	23,900	(1,550)	46,820	....	....	....	9,000	12,400	....
Superior	60,000	....	....	....	....	25 000	....	....	....	....	....	....
Waukesha	....	....	....	....	....	....	....	....	38,000*	....	....	....
Canada:												
Lethbridge, Alta	....	....	....	....	(10,000)	....	....	....	....	....	....	....
Stratford, Ont.	....	....	....	3,500	....	....	....	....	....	....	....	20,00

*Work done by contract. †—Work done by municipality. a—One of these will probably be selected. b—Kind not decided upon. c—Includes 900 yards of untreated cedar block. d—Amount not decided upon.

LAYING WOOD BLOCK PAVEMENTS.

Proper Finish of Surface to Concrete Base.—Joints Between Blocks.—Manner of Laying.—Some Common Errors.—Kind of Timber.

At the January meeting of the American Wood Preservers' Association, H. L. Collier, engineer for the Yellow Pine Manufacturers' Association, read a paper in which he developed at some length the advantages of creosoted yellow pine wood block pavements, and answered the objections which have been advanced against this pavement; ending the paper with his ideas as to right and wrong methods for laying wood block pavements. As the object of the association with which he is connected, like that of the National Paving Brick Manufacturers' Association, is to secure that use of this particular product which will give the greatest satisfaction to the users and thus increase the popularity of wood block paving, his ideas should certainly have great weight. They are as follows:

First, be careful in making the Portland cement base. Have the ingredients carefully selected and well mixed; proportion depth to traffic, and always finish the concrete base with a template and straight-edge, exactly parallel to the contour and grade of the finished pavement.

As to cushion for the blocks, I prefer the mortar bed—of one part cement and three parts screened sand, mixed dry, struck off with a template and dampened with a hand-sprinkler just in advance of the paver.

Lay the blocks close-jointed sidewise and with ⅛-inch joint between ends of the blocks, carefully spaced.

At the curbs provide an inch expansion joint for a 30-foot street, between curbs, and 1½ inches for a 50-foot street.

Have **no** transverse expansion joints on the pavements.

Trim the blocks to fit neatly around manholes, catch-basins and all permanent fixtures; provide necessary expansion joints around same.

Let the blocks be brought to a firm bearing by means of a hand-rammer in the hands of an active, careful laborer, or quickly rolled with a light tandem roller, from three to five tons.

After the blocks have been spaced, inspected and low blocks brought up to grade, the surface should be swept broom clean and a bituminous filler, so compound as not to melt below 175 degrees Fahr. or become brittle above 15 degrees Fahr., heated until as thin as water, should be poured on the surface and worked back and forth with a squegee until all cracks, interstices and expansion joints are three-quarters full, using sufficient force on the squegee to leave only a **thin** coating on the surface of the blocks, into which, while hot, sprinkle a layer of pebbly sand.

Traffic should be excluded for at least four days, and longer, if necessary, for the mortar bed to properly harden.

If a sand cushion is used, let it be only ½-inch in depth, made of screened sand not too fine.

Instead of mortar bed or sand cushion, a splendid plan is to paint the concrete base with a coating of paving pitch or asphalt cement, with 10 per cent., by weight, of Portland cement, stirred in when the pitch or asphalt is heated up to 300 degrees Fahr. and applied promptly; spread with a squegee, and into this wash, while hot, set the blocks, grain up, as above specified. This plan should be used universally on bridge floors.

What Should Not Be Done.

Blocks should not be **loosely** laid on a sand cushion, varying from ½ inch to 2 inches in depth and a sand filler used—remember, wet sand is as unyielding as granite. You could with equal propriety each day drive steel wedges between the blocks. As the blocks shrink the sand trickles down to fill the space made and keeps the blocks hugged in this narrowest limit. When the blocks are wet so also is the sand, and when the blocks want to expand to their natural sizes the wet sand will not yield and a buckle of the block occurs.

If sand is to be used as a filler, lay the blocks **close-jointed,** both longitudinally and transversely, and place a ½-inch layer of coarse, pebbly sand on the surface.

Neither should a paving pitch filler be used unless specially made for the purpose, guaranteed not to melt below 175 degrees Fahr. or become brittle above 15 degrees Fahr.

Ordinarily paving pitch on a wood block pavement is a nuisance in hot weather, and below 50 degrees Fahr. it is absolutely unyielding. Wood blocks will want room for expansion below 30 degrees Fahr.

As to Timber.

Like the specific gravity of the oil, too much of a bugaboo is made of the amount of heart lumber to require. We have diligently searched for evidence to prove that sap in creosoted wood blocks wears more rapidly than heart, and not in one instance have we found such evidence. If the blocks are laid level on a concrete foundation with close joints, the compression or wear has been perfectly regular, as much on the heart side as on the sap side. The treatment seems to toughen the timber, making the heart and the sap of equal wearing surface in paving. Therefore, we say there is no good accomplished in calling for 66 per cent. or 95 per cent. of heart. Such requirement adds considerably to the cost of the timber. Saw mill men are willing to sell heart lumber, but they greatly increase the price charged therefor.

We know we are to meet keen competition in pavement contracts, and therefore advise against unnecessary restrictions which add to the cost and not to the durability of the pavement.

"**Square-edged** and **sound** virgin southern yellow pine, free from all defects which would injuriously affect the timber for the uses intended," are all that is needed in an up-to-date, first-class timber specification for paving blocks.

Our municipal engineers occasionally specify "prime timber." We have no classification by that name in the Yellow Pine Manufacturers' Association.

UNJUST CONDEMNATION OF PAVEMENTS.

An illustration of how a bad name is sometimes given to good material by faulty construction due to ignorant or careless officials is given us by a contributor from Pennsylvania. The county commissioners two years ago laid upon one of the county bridges creosoted wood blocks in the following manner: Three-inch planks were laid at an angle of about 30 degrees to the line of the bridge, the plants, however, not being of a uniform thickness. Over them was spread a light cover of sand, and on this the blocks were laid at right angles to the traffic. The interstices were filled with sand, and hot pitch was spread over the blocks. According to the specifications, the planks were to have been covered with three-ply tar paper and the tar was to have filled the joints. Neither of these requirements was carried out, nor, it was said, was the tar of the consistency called for. The result is that today the blocks are from three to four inches out of line on each side of the bridge, the joints forming arcs pointing in the direction of the traffic; and as there is no division of the driveway the effect is the formation of reversed curves. On account of the loss of the sand filler from the joints, removing the lateral support of the blocks, many of these are split and broken.

Whether this particular bridge has ever been cited as an illustration adverse to wood block paving we do not know, but there are probably similar instances of this and most other kinds of pavement which are quoted by competitors as failure of the material, for which the material itself was in no way to blame. This is one of the reasons why decision as to choice of paving materials should be in the hands of those who are experienced in such matters, and should not be decided by visits to one or two pavements, which visits are in many cases "steered" by advocates of some one material.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance.

ROADS AND PAVEMENTS

Virginia Paving Will Be Inspected.

Selma, Ala.—A committee composed of Mayor J. L. Clay and City Engineer Julien Smith was appointed at a meeting of the city council to go to Portsmouth, Va., with a committee of citizens to make a thorough investigation of the paving material which is being used by a paving concern after a large contract for paving there.

Would Designate Two Kinds of Pavement.

Trenton, N. J.—A bill, introduced by Mr. Marshall, is pending in the legislature, providing that it shall be lawful for any board or body, acting under the authority of the act of June 30, 1898, and amended April 16, 1909, to which this act is supplemental, to designate two or more kinds of permanent and durable material with which the street or highway may be improved in the ordinance providing for the improvement, and to advertise for bids for the work of making the improvement with each of the materials so designated, as well as to select and determine by resolution or otherwise, which of the materials so designated shall be used in making the improvement when the bids are in, and to contract for the work accordingly.

Paving Cutters Want Increase.

Albion, N. Y.—The paving cutters of Orleans County are asking for a 10 per cent. raise in wages this spring and a reduction in the work day from nine hours to eight. The men affected are those employed in the sandstone quarries cutting paving blocks for use in paving streets. They number 300 in this vicinity and are members of an international organization covering the United States and Canada. The head office of the union is in Albion. The new bill of prices took effect January 1, but as the work is conducted entirely in the open, the resumption of work will not be until about April 1, and the consideration of the proposition will not be before that time. The price hitherto prevailing was 55 cents per superficial square yard. The price now asked is 60 cents per yard. When it is stated that in a normal season some 300.000 square yards are cut in this district, the importance of the business to the community will be readily realized. J. Sherett, the general secretary of the paving cutters' organization, stated that in the event of a strike or a lock-out, the men would probably seek work elsewhere, as there is a bright prospect in various parts of the country for the coming season and there will be little need for idleness.

Coast-to-Coast Road Fund Helped with $100,000.

Indianapolis, Ind.—One hundred thousands dollars more has been added to the ocean-to-ocean highway fund which is being gathered by the manufacturers' temporary committee, in charge of Carl Fisher, to build a trans-continental rock road from New York to San Francisco. The Hudson Motor Car Company, through its president, R. D. Chapin, has contributed 1 per cent. of its gross earnings for one year to the cause. This brings the total manufacturers' fund considerably over the two million mark. With the manner in which the large automobile and accessory companies are preparing to swell the highway fund the success of the venture seems absolutely assured. The theory that the manufacturers' roadway will provide that quick and effective stimulant to automobile consumption which the industry will soon be in need of is now generally recognized as correct. Every contribution to the material fund which is now coming in is virtually another indorsement of that idea. In submitting the subscription of his firm Chapin says: "The automobile industry, within three years' time, will need a considerable stimulus to permit of the size of outputs we all will be ready for then. The building of good roads in the States of New York and California has so greatly increased the demand for cars in these localities that the value of good roads to our industry has been proved beyond a doubt. The ocean-to-ocean highway will be the means of increasing the sphere of usefulness of the motor car. It will, moreover, prove of national benefit, in that it will give the people of this country an incentive to tour the United States instead of Europe. Our scenery is just as good, and our people are just as anxious to view it. Give them a good automobile road and the money now being spent abroad will be kept at home. This is but one of the small benefits to be conferred by the roadway, the net result of which will eventually be, through the creation of countless tributary highways, to form a network of perfect highways all over the United States.

Laying Rock Asphalt.

San Antonio, Tex.—The work of retopping Maine avenue with a coating of Uvalde rock asphalt has begun and will be rushed to an early completion, weather permitting. The street will be resurfaced from Salinas street to Houston street. Work of retopping a portion of South Flores street will start soon.

Foothill Boulevard to Lose Bad Curves.

Hayward, Calif.—To lessen the danger of automobile and motorcycle accidents by the elimination of "death curves," a force of civil engineers under the direction of A. E. Loder and L. C. Winkelman of the state highway commission are now at work on the Foothill boulevard and the Dublin boulevard setting stakes for the reduction of the more dangerous turnings. All the turns that are considered risky are to be cut to a 500-foot radius curve. The Foothill boulevard is to be given an asphalt coating 30 feet wide for automobiles, while the macadam sides will be used by horsedrawn vehicles. The dangerous Bulmer hill, on the Dublin road, the scene of many accidents, will be cut and straightened out to a 5 per cent. grade. Two surveys have been made by Winkelman for this boulevard, one over A street, in the city, and one over B street, connecting with the Foothill boulevard. It is not yet known which survey will be adopted by the highway commission. Contracts are soon to be awarded for the work.

Many Miles of Street Improvements Completed.

Spokane, Wash.—While the city put in over 32 miles of street improvements during 1912—including paving, grading and sewers—the work done for the year was less than half that done in 1911, according to the annual report for 1912 of City Engineer Morton Macartney. The city on January 1, this year, had 59 miles of paving, 381 miles of graded streets and 136 miles of sewers, says the engineer. The engineering department saved over $26,000 out of his appropriation for the year. The chief recommendations made in the report are for the immediate construction of the $212,000 downtown intercepting sewer and for a system of improved arterial highways connecting paved streets downtown with improved country roads which run as far as the city limits. Following are the chief statistics in regard to improvements for the year given in the report:

Contract work completed in 1912, $1,005,193.65; contract work already let and remaining to be completed in 1913, $433,190.58; appropriated for engineering department, 1912, $101.200; spent, $74,708.09; returned to general fund, $26. 491.91.

Convicts Work Roads.

Camden, Ark.—County Judge E. B. McCall is working all county convicts on the roads of the county at present, and finds them to be a source of profit to the county. A great deal of work was necessary to build the approaches to the Martin free bridge over the Ouachita, and a considerable portion was done by convict labor. Other roads are being worked at present by the convicts. If the county undertakes to build two miles of gravel road proposed by former County Judge W. T. Martin, the convicts will have an opportunity of being benefactors to the whole county, besides more than earning their keep and the 75 cents per day which the law allows on their fines for each day's incarceration in jail.

Street Paving Contract Nearly Completed.

Richmond, Va.—Contractor John J. Curley has completed the concrete foundation for the Broad street paving to Third street, the extent of the present contract. Mr. Curley and Assistant City Engineer P. B. Taliaferro state that the entire job can now be completed in not more than ten working days, the actual laying of the paving blocks having proved to be the smallest part of this undertaking. Contractor Curley started actual work late in September. In addition to the work contracted for by Mr. Curley as local agent of the Washington Asphalt Block & Tile Company, the street railway tracks from Tenth to Third street have been entirely reconstructed, with new rails on concrete foundations, and bonded, and electric conduits have been laid by the Virginia Railway & Power Company near the curb line on both sides of the street. A large number of gas services have also been renewed, several hundred yards of new curbing has been set, and the crossings at street intersections have been replaced, all with a view of making a complete job of the paving, which will not soon again have to be cut to pieces. All of the conduit and track work to Third street and all underground work has been completed, and the concrete bed for the last half-block of paving poured.

Oklahoma Highway Department Wins.

Muskogee, Okla.—Friends of good roads in Oklahoma are happy over the action of the Senate in killing the House bill that provided for the abolishment of the state department of highways and the turning back the building and supervision of highways to township officers. Citizens of Oklahoma who believe that good roads are essential for the development of rural life and the success of the rural mail system, including the parcel post, were fearful that the department of highways might be abolished, which they felt would be one of the greatest misfortunes that could befall the state. The township system has been tried in Oklahoma for years, and has been a failure. Sidney Suggs, commissioner of highways, probably invited the attack upon his department by his hostility to the building of steel or "tin" bridges in Oklahoma. Commissioner Suggs insists upon permanent stone or cement bridges. This provoked the opposition of the builders of "tin" bridges, and they gave Commissioner Suggs a lively race for his scalp. Furthermore, the department of highways is seeking to amplify its powers so that it will be fully prepared to require than in every county funds for roads and bridges shall be properly expended, and that all bridge structures shall be built in a scientific manner, according to uniform plans which the department furnishes free of cost upon request. Above all, the department is asking that local labor and local material be used whenever possible, and under the supervision of a competent engineer.

Quebec-Miami Highway Will Be Completed at Early Date.

Washington, D. C.—The completion of the Quebec-Miami international highway, from the great lakes to the southern part of Florida, is expected by the close of the summer of 1913. Already that section of the road from Rouse's Point, on the Canadian border to Washington, is ready to travel, save for a few miles in Maryland, and this bit of road will be completed during the coming spring. From Washington south, there will be a new road through Virginia and the highway will pass over historic ground, crossing no less than twenty-seven battlefields of the civil and revolutionary wars. The road is being built by county bonds and by popular subscription, the chamber of commerce of Richmond having raised $75,000. In a recent letter to Norman M. Parrott, of Baltimore, the secretary of the Quebec-Miami International Highway Association, Preston Belvin, of Richmond, writes: "Here is some good news for you, $150,000 was voted last week in bonds for the Richmond-to-Washington highway from Spottsylvania courthouse south to the Hanover line. This is the best link in the chain. The money is now all in sight, and we have been working absolutely on the highway between Richmond and Washington since last summer and it will be completed during the fall. It is only a question of time to do the work. That portion of the highway, 135 miles between Richmond and North Carolina, will be finished by June 1, and possibly earlier. I am looking forward with a great deal of pleasure to the time when our friends in Richmond and Baltimore can exchange visits over the Quebec-Miami highway."

Provides for Convict Worked Roads.

Charleston, W. Va.—Just before the legislature adjourned it passed the bill which provides for the construction of a system of state roads by convict labor. All male persons sentenced to terms of imprisonment within the state, even though the sentence is imposed by a justice of the peace for a short period, are liable for duty on the road gang.

Propose Improving Ohio Mud Roads.

Columbus, O.—As the greatest single step for the betterment of unimproved roads of the state a bill introduced by Representative Hite, of the house highways committee, provides for compulsory dragging of unimproved roads. This method keeps the roads permanently crowned and naturally drained. Hite introduced this and a bill to provide a commission for the codification of the road laws, as measures necessary for immediate enactment in view of the postponement of the consideration of the general good roads measures until the next session. Hite's bill proposes that trustees of each township appoint one of their members dragging superintendent, who shall divide the township into districts and contract annually with one person in each district to drag the unimproved roads at the superintendent's designation. The superintendent is to receive not more than $25 a year and the compensation for dragging is not to exceed 25 cents a mile. All unimproved mail routes and main-traveled roads are to be included. There shall be not more than six miles of unimproved roads in a district. Neglect on the part of the superintendent or contractor is punishable by a fine of from $25 to $50.

The bill for the codification of the road laws provides for a commission of three and carries an appropriation of $4,000 to complete the work, which is to replace the codification bill withdrawn recently because, it was concluded, the subject had not been sufficiently studied.

SEWERAGE AND SANITATION

Epidemic Closes Up Town.

Wilcox, Pa.—Wilcox, a small town of 1,000 population near Kane, is threatened with an epidemic of scarlet fever. All the schools and places of public worship have been ordered closed.

Given New Authority to Drain Lots.

Chattanooga, Tenn.—Under a new ordinance, printed recently in the Record, the commissioner of education and health has been able to secure good results soon after the measure became effective. This ordinance has to do with property, owned by out-of-town people, on which nuisances exist. It is being applied just now more especially to stagnant ponds. Prior to the new legislation, the city's hands were tied unless the owner or his authorized agent

could be located. Now, unless abatement of nuisances can be secured otherwise, the city is empowered to remedy the trouble, charging the work to the owner, and in extreme cases to sell the property after a given period for the purpose of reimbursing the municipality.

Card System Proves Efficient.

Tacoma, Wash.—Mayor W. W. Seymour's report shows that the card scaling system installed by Pure Food Inspector A. B. Wimple is popular. The merchants who have won high scores have their cards framed and placed in a conspicuous place. The few who registered a low grade have been beseeching the inspector to pay them another visit, notice the change they have made and raise their mark. Miss Wimple inspected 550 food establishments during the month, and she condemned 32 pounds of fruit and 8 pounds of vegetables.

For a Flyless City.

Brooklyn, N. Y.—Dr. William Henry Hale, Superintendent of the Brooklyn Public Baths, has written to the Board of Estimate, recommending that the city employ Dr. Jean Dawson, a teacher in the Normal Training School of Cleveland, O., as an expert in the movement to exterminate the fly pest throughout the entire city. The work done by Dr. Dawson in Cleveland, Dr. Hale informs the board, has resulted in the practical extermination of the pest there, and earned for that place the sobriquet of "the flyless city." The best time for starting the movement is in the spring, he declares, before the flies have a chance to breed. The letter was referred to the Comptroller.

Report on South Orange Sewer Work.

South Orange, N. J.—The report for 1912 of the sewer committee of the South Orange Village Board of Trustees shows that 9,478 feet of main were added to the sewer system, and that the system is now 25½ miles long. There are 486 manholes and 104 flush tanks, and 1,184 houses have been connected. The cost of work done so far amounts to $179,132.67, of which $6,500 has been paid, leaving $172,632.67 outstanding. Maintenance last year amounted to $1,947.85, which is larger than usual, due to the raising of manholes of streets that were repaired.

WATER SUPPLY

Great Waste in Water.

Schenectady, N. Y.—A broken service water pipe on Crane street, near Lakeview avenue, Mt. Pleasant, undermined the pavement and washed a lot of earth into Cutler gully, the water escaping from the broken pipe at the rate of 10 gallons per minute or 14,400 gallons per day.

Millions of gallons of water are wasted through the breaks in service water pipes. C. R. Bruce, of the water bureau, the official discoverer of these breaks, says that since January 1, 68 pipes have been broken. It is usually a day and sometimes longer before the wasting water is shut off.

San Francisco to Have Hetch Hetchy.

Washington, D. C.—San Francisco's protracted fight for the use of the Hetch Hetchy valley as a reservoir site has been won by the city as far as the army advisory board, on which Secretary Fisher's decision will be based, is concerned. The board declares that the Hetch Hetchy project is $20,000,000 cheaper than any other feasible project for furnishing an adequate supply of water to the city. The water situation that will confront the communities around San Francisco bay if the plan is adopted by Secretary Fisher, as is probable within a week, is recapitulated by the army advisory board as follows:

Purchase of Spring Valley Water company, $35,000,000 to $40,000,000.

Further development of this company's system to about half the extent proposed by the company, $10,000,000. Purchase of water systems of communities outside of San Francisco, no estimate made. Construction of Tuolumne system as proposed by San Francisco, to be extended over about 50 years, $77,000,000.

Against these expenditures there will be developed 11,000 horse power, having an estimated capitalized net value of $45,000,000.

Standpipe Falls; City in Danger.

Cairo, Ill.—The big standpipe, 175 feet high, of the Cairo Water Company fell one morning last week and Cairo was without water or fire protection until late in the afternoon. The pipe was of steel and contained 400,000 gallons of water when it fell. The pipe in falling struck a string of cars on the Illinois Central track, demolishing a box car and one flat car. Traffic was tied up for over six hours. Illinois Central passenger train No. 207 was passing at the time of the accident. The standpipe fell across the track just after the train passed.

Plan for Salt Water System Is Abandoned.

Santa Monica, Cal.—Acting upon the recommendations of the city's consulting water engineers, Messrs. Quinton and Code, that there is an abundance of fresh water available at Santa Monica to meet all demand, the city will abandon all thought of installing a salt water fire protection system, and will at once get busy with plans for providing a system of large fresh water mains to serve the two business and amusement districts. This expense, estimated at approximately $75,000, will be met through the creation of an assessment district.

Save Water Heretofore Wasted.

Hagerstown, Md.—An example in conservation was given by the Washington County Water Company, which supplies Hagerstown, when it laid, at a cost of $20,000, two and one-half miles of 20-inch wooden pipe from the Edgemont reservoir to the Smithsburg reservoir, to impound 10,000,000 gallons of water now going to waste every 24 hours.

Fargo Filtration Plant Very Complete.

Fargo, N. Dak.—Fargo is again drinking water from the Red River of the North. It is nearly 25 years since this water has been utilized for domestic purposes, and the change is brought about by the completion of the new water purification plant, which was built at a cost of $125,000. Extensive chemical tests have been made in all portions of the city, and the engineers have just announced that the plant removes more than 99 per cent. of the impurities. Shipments to Fargo of water from the Detroit lake region will soon be a business of the past. The purification plant and pumping station is one of the most modern plants of the kind in the entire country.

Celebrate Raising of Aqueduct Gates.

Los Angeles, Cal.—By the lifting of the gates at the intake on Feb. 13th the waters of the Owens River began flowing through the great aqueduct toward Los Angeles. The stream will run 68 miles, fill Haiwee reservoir with 21,000,000,000 gallons of sparkling water, and be ready for the rest of its journey of 240 miles to Los Angeles. The entire aqueduct will be brimming with the finest water in the west May 13. With a mighty roar the water plunged through the four great steel gates and poured gleaming into the aqueduct while William Mulholland, chief engineer, stood with upraised signal hand and the group of Los Angeles aqueduct and city officials cheered the start of the water's race toward the city. Mrs. H. A. Van Norman, wife of the assistant engineer, hurled a bottle of champagne into the flood as it shot through the gates. Climbing into automobiles, the entire party followed the progress of the stream, keeping abreast of it, as it swelled down the canal, which is 62 feet wide at the top, 32 feet wide at the base and 10 feet deep. The engineers will follow the water all the way to Haiwee Lake, noting

the result of their long labor and study. The intake is located 11 miles north of the town of Independence, Inyo County, Cal., near Charley's butte. The canal at this point and for 21 miles south is not lined with concrete, as is the greater part of it beyond, because instead of losing water it gains in flow through the percolation of ground water into it. The whole 68 miles of aqueduct is built large enough to deliver 575,000,000 gallons of water per day into the Haiwee Lake, as the builders desired to take advantage of the early summer freshets in the Sierras and store all this flood water. The four gates are operated independently to regulate the flow. At the first gate stood G. Peterson, assistant engineer; at the second gate were J. B. Lippincott, assistant chief engineer, and Charles Lee, a former assistant engineer; Roderick MacKay, mechanical constructor, and H. A. Van Norman, assistant engineer, were at the third gate; and at the fourth gate were Edward Johnson, member of the Board of Public Works, and George Shuey, city superintendent of lands in the Owens Valley. President Frank Henderson of the water board was present. The gates were opened but half way, and water flowed through them at the rate of 130,000,000 gallons a day. After two days the gates will be flung wide open and about 32,000,000 gallons, which is the flow of the river at present, will be turned in the big canal. Several streams of water contribute to the canal on its way to Haiwee Lake. Night and day of late the work has been pushed to finish the canal to Haiwee, and 2,500 feet of concrete were built in five days. The work south of Haiwee which remains to be done consists of a stretch of half a mile which must be excavated, another 750 feet for conduits to be excavated, 3 miles to be concreted, and 2,000 feet of tunnels in San Francisco canyon to be finished. Most of this will be done in three or four weeks. All will be in readiness before May 13.

Water Is Free from Typhoid Bacilli.

South Bend, Ind.—City Sealer A. Albright, who recently sent samples of water from the wells at Joseph and Main streets, to the state laboratory at Indianapolis for examination, has received a report that the water is free from colon or typhoid bacilli. These wells are used by citizens generally, and it was feared that they might contain typhoid germs. There are several cases of typhoid in the city at present.

Expect Purification Plant Ready by July.

Dallas, Tex.—James H. Fuertes, accompanied by several of the city officials, including Mayor Holland and Engineer Preston, visited the water purification plant and prospective location for the sewage disposal plant. Mr. Fuerters' mission to Dallas was to inspect the foundations of the filtration plant and the condition of the work in connection with the repair of the broken cross wall in the reservoir and to confer with the Board of Commissioners regarding the sewage disposal work. Relative to the water purification works, Mr. Fuertes said: "The big basin is about three-fourths cleaned. The bottom has been under water for about fifteen years. The deposit within that length of time has amounted to 25,000 wagon loads. Figuring into tons and taking the average water consumption for the last fifteen years, it means there has been about five tons of mud deposited for every million gallons of water pumped into the reservoir. In other words, that reservoir has saved that much mud going into the stomachs of the people. The basin is cleaned out by washing the mud out with water, assisted by teams of horses hitched to wooden scrapers, formed to fit the bottom of the corrugation, or ridges, in the reservoir. They have five teams of horses and about ten men. The men handle fire hose and the water is delivered under pressure from the city pumps with great force and it breaks up the sediment and floats it down to the main outlet drain, which eventually carries all of the liquid mud out into the Trinity River. The work is being done very economically. It is only costing about 6 cents per cubic yard to get the dirt out of the reservoir, exclusive of the value of the water. The total cost, including the cost of the water, is about 10 cents per cubic yard. The repairs to the cross wall of the reservoir are progressing very well. The excavation of that part of the bank which caved in is nearly completed. The excavations at the filtration plant are practically down to grade excepting for the foundation walls for the chemical storage and machinery house, which are to be carried down to about four feet below the original level, so as to rest upon the stratum of hard clay. The work is getting along very well and I think there is no question but what it will be finished about June."

Claim Water Supplied by City Is Impure.

Birmingham, Ala.—A delegation of North Birmingham citizens appeared before Commissioner James Weatherly and vigorously protested against the water being sold in that section by the city of Birmingham from its municipal plant. The delegation charged that the city water was hard, impure and had caused sickness. The delegation was headed by F. D. McArthur. Others of the party included Dr. M. E. Mooreland, Dr. A. C. Mooreland, Dr. Walker, J. H. Berry, Dr. L. A. Jenkins, S. E. Price, C. C. Godison, W. W. Walker, Dr. Blackwell, and Cleon B. Rogers. The citizens said the water furnished by the city of Birmingham was the cause of considerable sickness, and then went into details as to the impurity of the water. The visit of the citizens followed the voluntary analysis of the Birmingham Water Company submitted to the commission to the effect that the water was impure. Mr. Weatherly said the water furnished by the city was of the same purity as that furnished by the Birmingham Water Works Company. He added that the city was arranging a purification plant at a heavy cost. He said the water now was from the company plant, the city plant being shut down. The commissioners asked for a vote on the question of whether the city should sell that nucleus of municipal ownership, and three of the delegation voted for the removal. The others voted against it.

STREET LIGHTING AND POWER

Warsaw to Have New Lights.

Warsaw, Ind.—The Warsaw city council has decided to install a tungsten system of street lighting. This will save the city about $1,000 a year over the present system.

Philadelphia's Mayor Vetoes 80-Cent Gas Ordinances.

Philadelphia, Pa.—The ordinances providing for eighty-cent gas, passed three weeks ago, were vetoed by Mayor Blankenburg, after the councils refused his request that they be recalled. The failure of the councils to provide other revenue for the city in place of that which would be lost by the reduction in the price of gas was among the reasons given for the veto. The ordinances before passage were advocated by the Mayor, who, however, suggested other methods of taxation.

Second Month of Nisqually Plant Shows Immense Saving.

Tacoma, Wash.—Earnings of the light department of the city for December, 1912, the second month of the operation of the Nisqually municipal power plant, show the greatest net earnings of the department in the history of the city. The exact amount of the net earnings for that month were $27,694, more than double the net earnings of the previous six months. This revenue increase is entirely due to the operation of the city's own power plant. Officials of the department state that this record will be broken within a very short time, for, now that the city is buying no current from private corporations operating here, the above amount can be increased by at least $10,000 for the month of January, the amount which was paid to private companies for current in December. A trial balance taken at the last of the year shows the electric light plant, exclusive of the Nisqually power house and headworks, to be worth $1,802,723. The Nisqually plant cost $2,100,000, approximately. The gross receipts of the light department were $53,796 in December, which is an increase of $12,240 over the past average. This is due, in part, it is said, to the

efforts of the department in obtaining new power consumers, such as factories and mills. The operating expenses of the light and power department decreased $2,000 during the month. The total valuation of the water department is shown to be $2,912,126. The gross receipts of the water department for December were $33,350, and the expenses were $14,051. While the gross receipts were $2,000 less than the general average, the operating expenses were $4,600 less.

Vote Against Municipal Light Plant.

Sharon, Pa.—Sharon will not have a municipal electric light plant, at least for five years. The question was definitely decided by unofficial referendum election, when the proposition to go ahead with, or discontinue the project was decided against the civic improvement by a majority of 89 votes. There were 1193 votes cast. Unless something unforeseen occurs the borough will abide by the decision and sign a contract with the Shenango Valley Electric Light Company for a term of five years at the following figures:

Street Lights—$48 per year, each.

Commercial Lighting—9 cents per k. w. maximum; 5 cents per k. w. minimum.

The present rate is:

Street Lights—$75 per year, each.

Commercial Lighting—12 cents per k. w. maximum; 5½ cents per k. w. minimum.

FIRE AND POLICE

High Pressure Hydrant Test.

Boston, Mass.—Under 150 pounds pressure the hydrant to be used for Boston's high pressure service demonstrated during a preliminary test that it is capable of discharging 2,200 gallons of water a minute, which is equal to the capacity of three engines under the present system. The test also showed that 3,000 gallons a minute can be discharged when the pressure is 300 pounds to the cubic inch. The test met all expectations of Commissioner Rourke.

Would Establish State Police Bureau.

Berkeley, Cal.—The Association of Police Chiefs of the State, of which Chief of Police Augustus Vollmer, of Berkeley, is president, are sponsors of a bill now pending before the legislature whereby the state will be saved $100,000 a year if the bill is passed, according to Chief Vollmer and other officials. The measure provides for the establishing of a state police bureau. The saving, it is claimed, will be made from lost and stolen property recovered by means of a co-operation possible through such a state organization.

Two New Stations Occupied by Firemen.

Dallas, Tex.—Firemen and apparatus have moved into the new Central Fire Station and the demolition of the old is to begin. The new is on Main street, immediately east of the new City Hall site. The old is on Harwood and Main streets, a part of the City Hall site. The new house was purchased for about $20,000 from the owner, who had secured it from the Woodmen of the World. The city has remodeled the building and put a third story on it at a cost of about $20,000. It covers 50x100 feet. The walls, partly undermined by the excavation for the Municipal Building, have been underpinned with concrete to the solid rock. The house is steel and concrete throughout and thoroughly fireproof. The third story contains the exchange and batteries of the fire alarm circuits, now in duplicate. and capable of handling more than ten circuits and more than 600 boxes.

The old building was on a lot bought by the city about thirty years ago, when the waterworks system became a municipal property. The standpipe which was on the lot was removed to Oak Cliff, and still is in use by the city. The building is about twenty-five years old.

Mayor Holland and Fire and Police Commissioner Blaylock went with Street and Public Property Commissioner Lee to see the beginning of operations in the new station.

Firemen and apparatus of No. 4 Fire Station, in temporary quarters since the sale of the City Hall and the adjacent fire station three years ago to Adolphus Busch, have moved into the new fire station on Young street, near Ervay. The new station was erected at a cost of about $20,000 and is a very attractive and roomy structure.

Noted Fire Horse Record Maker Dies.

Kansas City, Mo.—"Dan," one of a team of famous fire horses which established a world's record for quick hitching at the international firemen's congress in London in 1893, died recently in Kansas City at the age of 34 years. Representing the Kansas City fire department, "Dan" with his mate "Joe" established a hitching record of one and three-fifth seconds. "Dan" was pensioned "on full pay" by an ordinance passed by the city council six years ago. Since then he has passed the time in Swope park. "Joe," his mate, was killed in a collision with a cable car.

New Fire Station Opened.

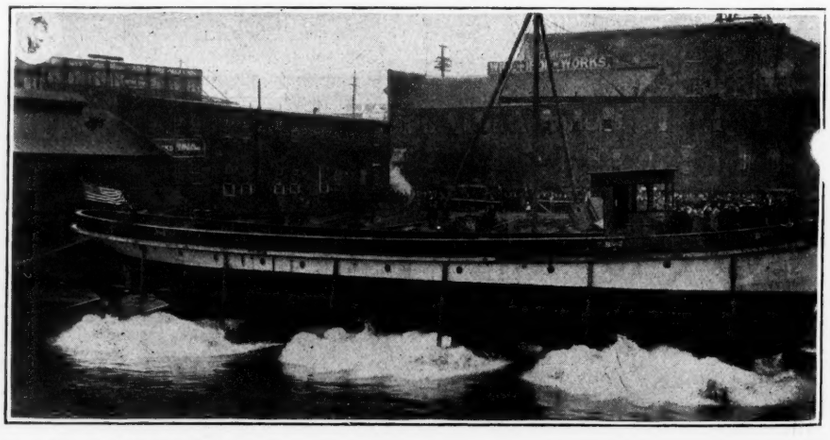
Boston, Mass.—Boston's new fire station at Oak square, Brighton, was opened at rollcall the morning of Feb. 21, and motor-propelled ladder 31 was placed in commission. Lieutenant Daniel L. Cadigan of ladder 22, Monument street, Charlestown, has been ordered to take command of the new company.

New Fire Boat, "W. J. Gaynor."

New York, N. Y.—A new fire boat, the eleventh in the department, is to be launched at Elizabethport, N. J., in five or six weeks. It will be named "W. J. Gaynor," after the mayor.

Powerful Fireboat Launched on Pacific Coast.

Portland, Ore.—The launching of the fireboat David Campbell, named in honor of late Fire Chief Campbell, who lost his life in June, 1911, in the Union Oil Fire, gave to the fire service of Portland one of the most powerful fireboats on the Pacific coast. When completed it will be capable of throwing 12,000 gallons of water a minute under 100 pounds pressure and will have a speed of at least 14 miles an hour. Among the equipment will be one 12-inch turret nozzle, one 8-inch pilot nozzle, one 8-inch water tower, 10 4-inch rail turrets and 20 3½-inch hose connections. Powerful streams of water can be thrown from each of these turrets and hose connections at the same time. The boat is being constructed by the Smith & Watson Iron Works. The fire boat was christened by the widow of Chief Campbell and the illustration was taken at the launching of the boat.



Courtesy Portland Telegram.

LAUNCHING OF FIRE BOAT "DAVID CAMPBELL."

MOTOR VEHICLES

Gorham Engine Passes Test.

Los Angeles, Calif.—The new Gorham motor propelled combination hose and pumping engine was recently given a test for hill climbing and road work and for its pumping capacity and found to comply with specifications. Tests of 2,000 feet of Bay State and 3,000 feet of Paragon hose also showed the specifications had been complied with. The fire commission recommended the council accept the engine and hose.

Boston Gives Dixon Pump Service Test.

Boston, Mass.—Boston has decided to give the Dixon automobile fire pumping engine an actual service test. A Dixon machine has been installed in a down town station where it takes the place of a No. 1 size steamer drawn by three horses and a two-horse hose wagon. By so doing, besides the saving on the keep of five horses, the company will have the service of three additional men for fire fighting, since one driver, an engineer and an assistant will no longer be required at the apparatus. Boston, it is claimed, is short of fire fighters and it is believed that by the introduction of automobile apparatus generally the number of workers will be increased without adding to the number of men in the department. The new engine has a 94-horse-power six-cylinder gasoline motor. The same motor drives the pump, being drawn into the gear without the driver leaving his seat, or the driver may work the apparatus while standing beside the car. The machine has been given satisfactory trial runs throughout suburban territory, going as far as Brockton. It has performed service at two fires, one of them a large fire in Charleston.

Town Officials Boast Superior Fire Equipment.

Wakefield, Mass.—Chief William E. Cade of the fire department and town officials declare that the acquisition and acceptance of the new $10,000 motor truck gives this town one of the most modern departments owned by any municipality of its size in the state. Besides the motor truck, equipment at the central station includes one of the late type steam fire engines, a reserve engine, a hook and ladder truck and a supply wagon. There are five permanent and twenty call men. In the Greenwood district is located the three-horse combination wagon, formerly at the central station; and at Montrose is another horse-drawn hose wagon. Besides these, the Volunteer hose company has a smaller motor truck.

New Auto Truck Is Demonstrated.

Wheeling, W. Va.—The city's new combination fire truck was given a thorough testing by Fire Chief Rose and other officials and, according to Chief Rose, comes up to the standard of all that was expected. The truck was tried out on Fulton hill and climbed the hill several times with an average speed of 20 miles an hour. Later in the day the Vigilant engine was attached to the truck and the big machine pulled the engine up the hill at a rate of 15 miles per hour. The Vigilant engine weighs 7,500 pounds and the new truck weighs 6,500 pounds, and it is considered the truck will be just what is needed for fires that break out on the hills about the city. The machine was given a trial for speed and made a trial run from Eleventh street to the stone bridge in Elm Grove in a fraction less than 11 minutes despite the fact that it was necessary to run slowly at different points along the road on account of the many vehicles. The machine is built for 60 miles an hour and according to those who made the trial trip, runs as easily as a touring car. The truck was driven by Demonstrator Weisant of the American-La France company. Fire Chief Rose, Chief Baumberger of the McMechen fire department, Capt. Burley Thompson of the chemical house, Allen Adams and Ross Prysock made the trial run on the truck.

Daytona Purchases a La France.

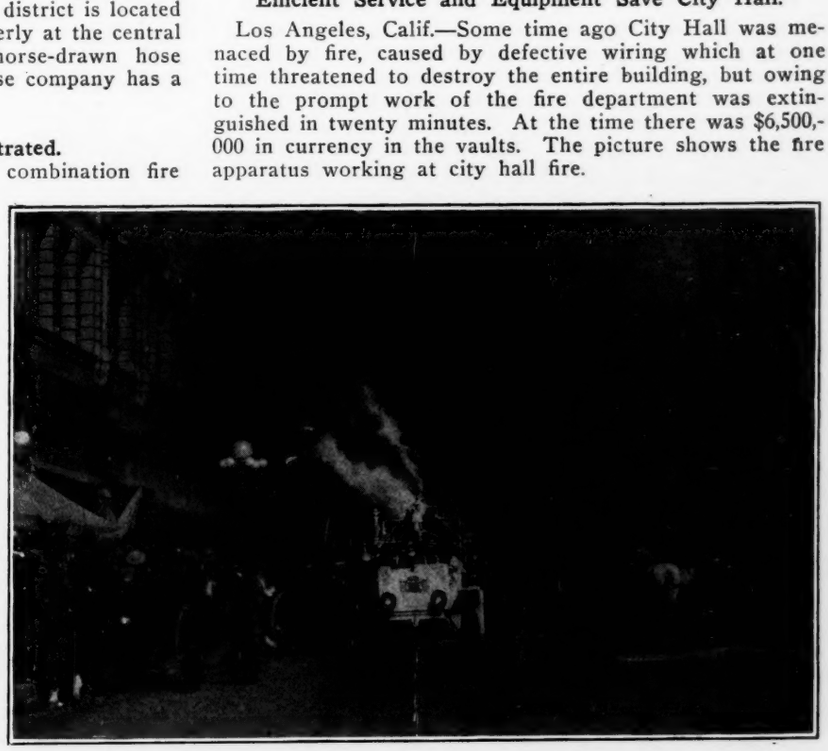
Daytona, Fla.—The city of Daytona has purchased an automobile fire truck and the new apparatus will be in the city and ready for service late this spring or early in the summer. The necessary official action was taken by the city council at its adjourned meeting held in the city hall when the finance committee was authorized to sign a contract with the agent of the American-La France Fire Engine Company of Elmira, N. Y., the fire truck to be built and delivered to the city in about three months. The truck purchased by the city of Daytona, through Agent C. B. Payne, is a powerful truck, carrying a chemical engine of forty gallons capacity and 1,200 feet of hose. The truck is equipped with electric starter, so it can be started with the turning of a switch. The plan of the city council is to have two men paid to be constantly in charge of the truck, one for day service and the other at night, and to have a small company of about eight men trained to handle the apparatus and hose at all fires. These men are to be paid for service at all fires, but will not be on duty all the time.

High Efficiency After Three Years' Service.

Augusta, Ga.—The report of the National Board of Fire Underwriters on the condition of the Augusta Fire Department contains some records of pumping engine tests which make the Webb engine show up well after three years of service. This engine discharged 686 gallons of water per minute against a net water presure of 107 pounds, which is equivalent to 91 per cent. of its rated capacity. This engine was put in service in 1910. The steam fire engines did not show up as well; it is only fair to state, however, that they were much older. A La France steamer put in service in 1900, rated capacity 650 gallon, discharged 430 gallons against a net water pressure of 90 pounds, showing 78 per cent. of its rated capacity. A Button steamer, in service since 1884 discharged 63 per cent. of its rated capacity. A Silsby steamer, 1882 with new boiler in 1905, discharged 54 per cent. rated capacity.

Efficient Service and Equipment Save City Hall.

Los Angeles, Calif.—Some time ago City Hall was menaced by fire, caused by defective wiring which at one time threatened to destroy the entire building, but owing to the prompt work of the fire department was extinguished in twenty minutes. At the time there was $6,500,000 in currency in the vaults. The picture shows the fire apparatus working at city hall fire.



Courtesy Los Angeles Tribune.
FIREMEN AND APPARATUS AT CITY HALL FIRE, LOS ANGELES.

Cost of Fire Chief's Runabout.

Yonkers, N. Y.—The Yonkers fire chief and the first and second assistant chiefs, or deputies, have been given three 4-cylinder, 28-30 horsepower gasoline runabouts, equipped with electric cranking, electric lights, electric horn, fire gong, buggy-top, etc. These were installed in October, 1912, and since that time enough data have been gathered to warrant a comparison between the horse and the automobile in this particular capacity. The figures are arranged in tabular form below. As may be seen, the result in actual cash saving per month, speaks well for the automobile.

MONTHLY SAVING ON CHIEF'S RIG—HORSE VS. MOTOR.

HORSE.		MOTOR.	
Feed	$0.33 per day	Gasoline	$0.17 per day
Shoeing	.26 per day	Oil	.05
		Grease	.03
Total	.59		
Total motor	.25	Total	$0.25
Daily saving	.34	$0.34 daily saving	
		30 days	
		$10.20	
		Saving per month.	

Gasoline, 17 cts. per gal., 1 gal. per day.
Oil, 60 cts. per gal., 2 gals. per month.
Grease, 15 cts. per pound, 3 oz. per day.

Two other points in favor of the machine, mentioned by Chief Baker, are first, the hill climbing power of the runabouts. In a city having the seven hills of Rome, the value of this point cannot be over estimated. The second point is the speed with which they enable the executive to reach the scene of the fire.

GOVERNMENT AND FINANCE

Adopt Commission Form.

Ladysmith, Wis.—This city at a special election voted to adopt the commission form of government by a majority of 211 votes or practically a 5 to 1 vote.

City Docks Return Increased Profits.

Tacoma, Wash.—The municipal dock made a profit of $346 during January, which is $111 more than the profit made in January, 1912, according to the monthly report of Superintendent William Hall, placed on file with Mayor W. Seymour. The city dock made a larger profit, clearing $408 during the month, which is $344 more than was made during the same month last year. The total profits of the two municipal docks were $754.

Annual City Report Submitted.

Burlington, Vt.—It will require $281,104.68 to run the city of Burlington for the coming fiscal year, according to Mayor Robert's official report, just delivered to the city clerk. This amount must be raised by taxation. The resources of the city are $94,208.98, and the liabilities are $89,554.89, leaving an excess of resources over liabilities of $4,654.09. The mayor estimates the current expenses for 1913 as $344,958.77 and the estimated receipts at $59,200. Some of the big items included in the estimate are streets, $33,500; schools, $79,000; fire, $26,000; street lights, $17,000; water, $53,961; city hall repairs, $10,000. The amount to be raised by taxation is $281,104.68.

Mayor States Commission Saves City $470,000.

Trenton, N. J.—Since the City Commissioners took office in August, 1911, they have effected a saving of $470,000 that must have been spent during the next 30 years, according to a statement made by Mayor Donnelly in reiteration of his speech at Jersey City. When the Commission came into office there was a floating debt, covering the years 1905 to 1909, inclusive, of $360,000. The debt was incurred by the old Common Council by the expenditure of moneys in anticipation of taxes which were never collected. In accordance with precedent, according to the Mayor, bonds to that amount would have been issued by the city and there would have been no effort to collect the money. By efficient methods, system and through the efforts of the delinquent tax collector, $200,000 of this floating debt has been wiped out. This will make it necessary for the city to issue bonds for only $160,000 instead of $360,000. Thus the city, the Mayor states, has not only saved the $200,000, but it has also saved the interest on that sum for the next 30 years, which, at 4½ per cent., would amount to $270,000 in itself. This makes a total saving in interest and principal of $470,000. The yearly saving would be aproximately $15,500. The floating indebtedness for the years 1910, 1911 and 1912, were not estimates in the saving for the reason that the debts are largely covered by taxes on real estate which are not yet delinquent and are collectable under the Martin act. At the present time the floating debt of the city is $567,800 less than it was when the Commissioners took office. This also is exclusive of the debt for the years 1911 and 1912, $435,000 of which is covered by collectable real estate tax assets. During the first six months of commission rule, according to the Mayor, the city's floating debt was reduced $178,100. That was before the appointment of the delinquent tax collector, and, it is said, was brought about largely by increased efficiency and through systematic methods introduced by Price, Waterhouse & Company.

City Is Getting Rich.

Bristol, Va.—With the revenue from its liquor business the municipality of Bristol, Virginia, is rapidly becoming rich. After meeting all financial obligations promptly, including the interest on its bonds and the retirement of bonds as they fall due, the city now has a balance of $74,000 in its strong box, while May 1 will bring to it about $50,000 additional in licenses to sell whiskey. With this large sum of money coming in annually the city is in a position to aid many causes. Its council body has voted $400 to the Children's Home Society of Virginia. It has contributed an amount monthly to pay for a trained nurse to work among the poor people of the city. It is now considering the matter of establishing a "white way." But in the face of all these things, attributed in a measure to the right to sell whiskey in Bristol, the temperance people declare that there is another side to this picture.

Budget Reported to City Council.

Lynchburg, Va.—The finance committee of the city council has reported the appropriations ordinance or budget for the year beginning Feb. 1, in which appropriations are carried for the operation of the city during the fiscal year to the aggregate of $640,700.83. In round numbers, the budget carries $54,000 more than last year. Provision is made for $131,000 for bonded debt interest and about $50,000 for the sinking fund. Owing to the fact that the city has about $300,000 worth of new street work under contract and in progress, only $16,000 is provided for new street work, and this will probably be devoted to new sidewalks. The sum of $7,000 is appropriated for sewer extensions, this being in addition to a large sum out of the last bond issue, still available.

Salary Ordinance Defeated.

Meridian, Miss.—The city election held to pass on a proposed salary ordinance fixing the salary of the mayor at $3,600 and of the two councilmen at $3,200 was defeated in every ward of the city, the total majority against the ordinance being 272, out of a vote of about 900, which is a small vote. It was considered by the voters that the salaries proposed were rather high, owing to the fact that the mayor is now, and has been for several years, working for the sum of $175 per month. Another ordinance, which will probably carry a reduced salary, will have to be submitted and adopted by the mayor and councilmen before they will be permitted to draw any salary.

Will Test Home Rule Amendment Charter.

Columbus, O.—City Solicitor Cornell L. Schreiber, of Toledo, and Attorney-General T. S. Hogan will go before the Ohio Supreme Court to ask leave to file a suit in mandamus to test the constitution, adopted by the voters last fall. The big question which the court will be asked to settle is whether municipal home rule becomes effective before municipalities adopt charters under its provisions.

May Repeal Commission Plan.

Des Moines, Ia.—Coincident with the demand made in bills introduced in the Iowa legislature to extend the privilege of the commission plan of government to all cities of 2,000 population or more, is the statement of Representative Frank Shankland, of Polk county, that an intense dissatisfaction with the operation of the plan in Des Moines, where the system was created, has already started a formidable movement to repeal it at the municipal election one year from next March. By the nature of the law which put the commission form of government into operation in Des Moines, the question as to whether it shall be continued or not is ipso facto referred to the electors at the next election. The plan which was established in Des Moines on the slogan "It Can't Be Worse" will have to struggle against its own banner in the coming fight, it is claimed. Opponents to the measure claim that in abolishing the representation of special districts under the old plan, which was heralded as one of the chief virtues of the commission plan, it has furnished in the city council a representation of special interests. It is an open secret that the present city council was elected on a slate supported by three special interests in Des Moines. Opponents to the continuation of the plan will use this as one of the chief arguments against its operation.

STREET CLEANING AND REFUSE DISPOSAL

Prizes for Cleanliness.

Wichita Falls, Tex.—The Chamber of Commerce has announced an offer of $100 in prizes for the best-kept yards and premises in the city during the coming spring. Many have entered the contest and it is expected to stimulate the planting of trees and flowers. The contest idea originated with the Civic League, a woman's organization.

For Clean Townships.

Topeka, Kan.—The House has recommended for passage the Laing bill compelling the township trustees to rid their districts of noxious weeds, rubbish and brush at least twice each year and at such times as the county commissioners may ordain. Western Kansas members, many of them, objected seriously to the bill and it was not until after a 40-minute oratorical fire works display that the house voted to put the bill on third reading for the passage.

Weed Cleaning Week Planned for April.

Los Angeles, Cal.—Enforcement of the weed ordinance which calls for the removal of weeds from vacant lots once in the spring and once in the fall, again is attracting the attention of the street department, and a request for an appropriation of $15,388 to start the revolving fund has been made to the council by the board of public works. The ordinance provides that property owners must have removed from their vacant lots all weeds in the two weeks following the third Monday in April; otherwise, the work will be done by the city and the cost charged to the property owner and collected along with the taxes. Under this law the street department must begin work on May 16. The ordinance also provides for a fall clean-up, but last fall no appropriation was forthcoming by the council and the work was not done.

Open Winter Increases Street Cleaning Cost.

Milwaukee, Wis.—Weather conditions caused the city to spend more money this winter for street cleaning, according to the street cleaning department. On account of the absence of snow and rain there was much more dirt and dust, at the same time the weather was never warm enough to permit flushing of the streets. Charles O. Davis, superintendent of street cleaning and ash removal, stated that the city had been spending about $20,000 a month for cleaning streets. He said there were less complaints than ever before and added that most complaints of dust and dirt on the streets could be traced to the negligence of those who, in violation of the city's ordinance, sweep dirt from stores into the streets and dump the contents of vacuum cleaners into the gutters. During 1912 it cost Milwaukee $242,000 to keep its streets cleaned and an additional $228,000 for the removal of ashes and rubbish. Mr. Davis stated that complaints on account of the nonremoval of ashes and rubbish are few.

Garfield to Oil Streets.

Garfield, Kan.—A civic improvement campaign for 1913 has been started with a movement for oiled and graded streets. Though the town has a population of scarcely 250 the sentiment for progress is strong. The Commercial Club and other organizations are behind the movement, and it will likely be a success.

To Make Spotless City.

Dallas, Tex.—At a meeting of the civic improvement committee of Hella Temple, in matters pertaining to the plans for making Dallas a spotless city by Imperial Council time were discussed, the report of the subcommittee on prizes and awards was indorsed, and plans for the actual launching of the campaign within the next few days were decided upon. First, second and third general school prizes, to be awarded school which shows the greatest improvement in the beauty and cleanly appearance of its district from March 1 to May 5, were decided upon. The first general prize will be a Victor Victrola, value $150; second general prize, a stereopticon and slides for school work, and the third general prize is to be decided upon. Room prizes and four individual prizes in each school will also be awarded.

Lawrence Miller, chairman of the subcommittee on prizes to be awarded in a contest among the school children of Dallas for a cleaner and prettier city during the Shriners' Convention, said that the list of improvements, to be accredited in awarding the general school prize, included the general improvement of school grounds, general improvement of vacant lots within the school district, general improvement of yards, and lawns within the school district, removing signs and improving vacant buildings and outhouses, removing debris from streets and outhouses, the number and beauty of home and school flower gardens ir each district, and the number and beauty of flower boxes and pot plants presented to public view. Every student in the public schools of Dallas is expected to take part in this campaign in which, in addition to the general prizes, more than one hundred individual prizes will be awarded, including memberships in the Young Men's Christian Association, Young Women's Christian Association, athletic equipment of all sorts, cameras, books, etc.

RAPID TRANSIT

New Car Fenders on Trolleys.

Philadelphia, Pa.—Appliances designed to reduce the number of deaths by trolley accidents in the city will soon be placed on cars of the Philadelphia Rapid Transit Company. It is understood the company will soon install emergency fenders on their cars that may be operated by a plunger at the feet of the motorman. When an accident to a pedestrian is imminent the motorman by striking the plunger can drop the fender and save the victim from being drawn beneath the wheels. A partition is to be placed on the front platform of each car to prevent conversation between the motorman and conductor. Each car will also be provided with a jack, it is understood.

New Bill Places City in Control.

Chattanooga, Tenn.—Officials of the city of Chattanooga will soon have absolute power to regulate the handling of street cars within the corporate limits, if the bill now pending in the state legislature is passed. It has already been passed by the house and will come up in the senate, with chances for passage very favorable. This measure is absolutely without fault, insofar as carrying out the purpose for which it is intended. It will give to the city the right to require additional cars on any

line; to require waiting stations; to protect patrons from cold and heat, both while riding and while waiting for cars; to provide "jim-crow" regulations for the cars; to require double tracking where it is necessary; to require a reasonable number of cars to be in operation on all lines and to provide when cars shall be run.

Chicago Car Companies Offer to Unite Systems.

Chicago, Ill.—Surface and elevated railroads in Chicago delivered to the local transportation committee of the City Council the ultimatum in accordance with which they will consent to create a unified metropolitan transportation system. Subways in substitution for the antiquated loop, additional underground roads in more outlying sections on demand of the City Council, and universal transfers are among the public benefits guaranteed by the transportation interests. In return they demand 7 per cent. profit on the legal physical value of their property before any money goes to the city to pay for eventual municipal ownership. The city will get 70 per cent. of the net beyond the 7 per cent. profit, provided that percentage brings $2,000,000 or more. The traction company's 30 per cent. will be cut down should the city's share be below $2,000,000, until either the city gets that sum or gets the entire profit. A strenuous fight to reduce the company's demand of 7 per cent return on the investment was opened by the aldermen when the proposition was laid before the committee. The surface lines now are given 5 per cent. returns before turning over 55 per cent. of the remainder over to the city. The elevated lines now are earning about 6 per cent. on their investment. By the terms of the traction ordinance, the value of the surface lines is placed at $134,000,000. The elevated lines declared their properties were worth $80,000,000. In accordance with the proposition, this valuation would assure them a net profit of $15,000,000 a year before any sharing with the city would begin.

MISCELLANEOUS

Plans for City Fete.

East Orange, N. J.—The committee on plan and scope of the semi-centennial celebration in East Orange have decided on having a parade, a pageant at the playground, an historical exhibit and special church services as features of the celebration of the separation of East Orange from its neighbors fifty years ago. The observance will be in June. Residents will be asked to decorate their homes and have them brilliantly lighted at night.

City Farm a Money Maker.

Des Moines, Ia.—Councilman Zoli G. Roe declares he is rightfully entitled to the name of "Farmer" Roe since he has compiled figures on the municipal farm near Glendale cemetery for last summer. On 78 acres of oats, 3,000 bushels were harvested. On 45 acres of corn 2,100 bushels of corn were husked. On 15 acres of timothy hay, 30 tons were mowed, while on five acres of wild hay, ten tons were mowed. The cost of maintenance is about $3,000. However about $2,000 of this amount was spent for permanent improvements and machinery. The sale of the grain will not amount to as much as the expenditures. Comparative figures, however, shows the season a great success. When Council Roe took charge of the farm it was in a depleted condition. The improvements installed will be lasting and next year it is expected the farm will be a money maker.

City Plants Pecan Trees on the Streets.

Milledgeville, Ga.—The city of Milledgeville is taking a practical step forward towards improving the appearance of the town as well as adding to the enjoyment of its people a few years in the future, by setting out budded pecan trees where shade trees are needed. Experience in private undertakings show that had this plan been adopted some twenty or less years ago, as a result the citizens would now be gathering nuts in abundance for all. The pecan tree seems particularly well suited to this section and nowhere else are better nuts produced. The initial step was taken by the city council a few days ago, when one hundred fine trees were ordered and set out. The plan is to continue this work and in a few years thousands of pecan trees will be growing on public property.

Municipal Pensions.

Yonkers, N. Y.—Senator Healey introduced a bill which has been passed at Albany authorizing the city of Yonkers to pension municipal employes after 50 years' continuous service. Now it is found that the bill affects only one man, George Pilson, sanitary inspector, who is said to be the only survivor of John Brown's raiders.

Wants City Ice Plant.

Waterbury, Conn.—City Engineer Robert Cairns has expressed himself as being in favor of the city harvesting its ice from the city reservoirs. Mr. Cairns said that he had the matter under consideration and had suggested it at various times to several of the city officials. According to the idea of the city engineer the officials could have certain distributing points in the city where they could dispose of the ice at public sale without selling it from house to house.

Public Swimming Pools.

Fort Wayne, Ind.—By a bill which passed the house recently the city council of Fort Wayne may appropriate money or levy a special tax to provide funds for the construction of a public swimming pool, or public bath houses and after such appropriation is made the board of works must create the improvement. The bill was designed to meet a demand in Logansport but by its terms it applies as well to Fort Wayne.

Tacoma to Operate Cafetaria.

Tacoma, Wash.—Probably the first cafetaria ever operated by a municipality will be opened by the Metropolitan park board early this spring at the Point Defiance pavilion. On the first of the year the board took over all concessions at the pavilion including the boating dock, and it will operate them with the assistance of a superintendent. In addition to the money that will be spent by the board in improving the pavilion, $5,000 will be spent in erecting a car station with public comfort facilities near the street car entrance to the park. Plans for this building were prepared by Hare & Hare, of Kansas City, special park architects, several years ago. The present board will follow out the original plans to a great extent. Estimates for the work are being prepared now by the board and bids will be asked for soon. Food at cost will be the board's policy in operating its pavilion and an effort will be made to make the cafetaria one of the park's main attractions.

Limits the Height of Advertising Signs.

Atlantic City, N. J.—A crusade against the huge and towering signs of the Boardwalk is on, and the great framework advertisements that have been pushing themselves skyward in recent years will find a level laid down by municipal law. Several of the huge structures have been damaged recently in heavy windstorms, and the municipality has reached the conclusion that the resort shall have signs with safety, or no signs. Immense electric lighted areas, that show for nineteen miles at sea, light the line of the world famed walk, and advertise everything from the smelliest in cigarettes to the tightest thing in corsets. The great numbers of incandescent lamps employed aid materially in illuminating the atmosphere above the Wooden Way, but the new order of the city commissioners will change this, and in the future no sign will be permitted higher than 30 feet above the building upon which it is erected.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Dangerous Sidewalks—Snow and Ice.

Smith v. City of Cloquet.—Though mere slipperiness from the accumulation of ice and snow upon the streets and sidewalks of a municipality does not create a liability for injuries received in consequence of that condition, there may be a liability where the municipality negligently permits an accumulation of ice and snow to such an extent and for such a time that slippery and dangerous ridges, irregularities, and depressions are formed therein from travel thereon, or other causes, thus rendering the street or walk unsafe and dangerous for public use. Supreme Court of Minnesota, 139 V. W. R., 141.

Assessments—Waiver of Irregularities.

Weaver et al. v. City of Chickasha et al.—Where proper notice of the time and place for hearing objections to the report of appraisers has been given, and property owners affected appear at such time and place, and file their objections without raising the question that the report was not filed within ten days after the appointment of the appraisers, they will be deemed to have waived such irregularity. Supreme Court of Oklahoma, 128 P. R., 305.

Streets—Shade Trees.

Giauque v. Salt Lake City et al.—If the land on which shade trees adjacent to a sidewalk stood was owned by the abutting property owner, the city could only cut the trees by condemning the land upon paying a just compensation. —Supreme Court of Utah, 129 P. R., 429.

Streets—Vacation—Sale of Fee.

Van Valkenberg et al. v. Rutherford et al.—The statutory power of the city of Beatrice to sell the fee to vacated streets may be exercised by the mayor and council without a vote of the people.—Supreme Court of Nebraska, 139 N. W. R., 652.

Street Paving—Extra Work.

Uvalde Asphalt Paving Co. v. City of New York.—The bid, contract and specifications for a street improvement were entitled "bid," etc., as the case might be, for "regulating, grading, curbing and repairing," etc., and each contained many items of various kinds of work necessary either in laying original pavements or repairing. The printed description of the work in the specifications made it to consist of "regulating and grading the entire street (or if the street is already paved of removing or readjusting the old pavement)," but the only items on which bids were asked were for completed asphalt pavement, for concrete, and for furnishing and setting new concrete curbs, and the items for "earth excavations" and "earth filling," for which spaces were provided in the printed forms, were left blank. There was no plan on file in the bureau of highways, though there was an incomplete plan in the county clerk's office. Held, that the contract did not contemplate the doing of a substantial amount of earth excavation in regrading. New York Supreme Court, 138 N. Y. S., 1029.

Street Railways—Regulations—Fares.

City of Detroit v. Detroit United Railway.—A resolution adopted by a city council pending a dispute with a street railway company as to its franchise rights with respect to fares, etc., on certain streets, which permitted the company to continue operations from time to time "upon the same terms and conditions now prevailing in the city, whether due to contract agreement or not," though made when the city knew that the company was collecting extra fares on certain lines which were without the city limits when the franchises for such lines, which authorized extra fares, were granted, did not recognize the company's right to charge extra fares on such lines; the word "prevailing" having no technical meaning and as used signifying that which is common, in operation, or prevalent, while the words "terms" and "conditions" mean the propositions and limitations which comprise the agreement and govern the parties, defining their obligations, and as applied to an ordinance giving a franchise, signifying the boundary, limit or extent of the grant. Supreme Court of Michigan, 139 N. W. R., 56.

Sidewalks—Openings—Personal Injuries.

Myers v. City of New York et al.—If an abutting owner was permitted by a city to keep an opening in the sidewalk, the city was bound to see that it was properly used and sufficiently guarded, and if the city knew, or with proper care should have known, that such an opening was not so used or protected, it would be liable to one injured by falling into it for culpable failure of duty in respect thereto.—New York Supreme Court, 139 N. Y. S., 432.

Streets—Extension—Assessment District.

West Berkeley Land Co. et al. v. City of Berkeley et al. —Where nothing was done by property owners between the date of filing a map of the city addition and the acceptance of the streets delineated thereon by the city to indicate a change in the owners' intention to devote such streets to the use of the public, and it did not appear that the intervening rights of third persons were involved, an assessment district described as bounded on one side by a street, delineated on the plat, the name of which was subsequently changed, was sufficient to describe the boundary of the district, though the property owner attempted to annul the dedication by filing a declaration that the map was filed simply for convenience, and not with an intention to dedicate any street delineated thereon.—Supreme Court of California, 129 P. R., 283.

Change of Grade—Duty to Prevent Damage.

City of Lexington v. Chenault.—An abutting owner injured by a change of street grade is bound to exercise such care in preventing injury to the property as may be reasonably expected of a person of ordinary prudence under like circumstances.—Court of Appeals of Kentucky, 152 S. W. R.

Streets—Rights of Municipality—Franchise.

Northern Westchester Lighting Co. v. President and Trustees of Village of Ossining.—The only interest of a municipal corporation in its streets is that of the public in the highways, and it has no interest in protecting the rights of abutting owners of the fee against interference with the highway by third persons without the consent of such owners. Transportation Corporations Law (Consol. Laws 1909, c. 63) Sec. 60, provides for the incorporation of gas companies and for naming the towns, villages, cities, and counties in which their operation is to be carried on. Section 61 provides that, if incorporated to supply gas for light, they shall have power to manufacture gas and to acquire natural gas by purchase or otherwise, and to sell and furnish gas in such quantities as may be required in each city, town, and village named in the certificate of incorporation for lighting the streets and public or private places, or for other purposes, and to lay conductors for conducting gas through the streets of each such city, village, and town with the consent of the municipal authorities, and under such reasonable regulations as the authorities may prescribe. Held, that the statute constitutes the franchise of the company, and the consent of the municipal authorities merely makes it operative within that municipality.—New York Supreme Court, 139 N. Y. S., 373.

NEWS OF THE SOCIETIES

Calendar of Meetings.

March 10.

VERMONT SOCIETY OF ENGINEERS. Annual Meeting, Burlington, Vt. S. A. Reed, Secretary, Barre, Vt.

March 11-12.

ILLINOIS WATER SUPPLY ASSOCIATION.—Fifth Annual Meeting, Urbana-Champaign. Edward Bartow, Secretary, Urbana-Champaign.

March 19.

BOSTON SOCIETY OF CIVIL ENGINEERS.—Annual Meeting, Boston, Mass. S. E. Tinkham, Secretary, 715 Tremont Temple, Boston, Mass.

March 25-28.

AMERICAN CHEMICAL SOCIETY. Annual Meeting, Milwaukee, Wis. C. L. Parsons, Secretary, Box 505, Washington, D. C.

March 26-27.

NATIONAL FIRE PROTECTION ASSOCIATION. Annual Meeting, New York City. Ralph Sweetland, 141 Milk street, Boston, Mass.

March 27.

NEW ENGLAND STREET RAILWAY CLUB. Annual Meeting, Boston, Mass. H. A. Faulkner, Secretary, 12 Pearl street, Boston, Mass.

April 3-5.

AMERICAN ELECTRO-CHEMICAL SOCIETY. Annual Meeting, Atlantic City, N. J. J. W. Richards, Secretary, South Bethlehem, Pa.

April 15-16.

TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA.—Annual Convention, Charlotte, N. C. J. W. Neave, Secretary, Salisbury, N. C.

April 18.

UTAH SOCIETY OF ENGINEERS.—Annual Meeting, Salt Lake City, Utah. R. B. Ketchum, Secretary, 702 Newhouse Building, Salt Lake City, Utah.

April 18.

DETROIT ENGINEERING SOCIETY. Annual Meeting, Detroit, Mich. F. H. Mason, Secretary, 614 Moffatt Bldg., Detroit, Mich.

April 18-20.

SOUTHERN GAS ASSOCIATION. Annual Meeting, Charlotte, N. C. E. D. Brewer, Secretary, Atlanta, Ga.

April 24-26.

IOWA STREET AND INTERURBAN RAILWAY ASSOCIATION. Annual Convention, Waterloo, Ia. H. E. Weeks, Secretary, Davenport, Ia.

May 5-7.

NATIONAL CONFERENCE ON CITY PLANNING.—Annual Meeting, Chicago, Ill. Flavel Shurtleff, Secretary, 16 Congress Stret, Boston, Mass.

May 12-14.

SOUTHWESTERN WATER WORKS ASSOCIATION.—Second Annual Convention, Fort Worth, Tex. E. L. Fulkerson, Secretary.

June.

INTERNATIONAL ROADS CONGRESS—Third Congress, London, England. W. Rees, Jeffreys Secretary, Queen Anne's Chambers, Broadway, Westminster, London, S. W.

June 23-28.

AMERICAN WATER WORKS ASSOCIATION. Thirty-third Annual Meeting, Minneapolis, Minn. John M. Diven, Secretary, 47 State street, Troy, N. Y.

July 22-25.

LEAGUE OF WISCONSIN MUNICIPALITIES. Annual Convention, Neenah, Wis.

August 25-30.

FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE, Buffalo, N. Y. Dr. Thomas A. Storry, Secretary General, College of the City of New York.

September 1-6.

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Forty-first Annual Convention, Madison Square Garden, New York City. James McFall, Secretary, Roanoke, Va.

Ohio State Stone Club.

The annual meeting was held at Toledo, February 3-5. The membership of the association is composed of quarrymen whose principal business is that of supplying road metal. The organization is seven years old. The association has worked out many practical problems from operating the crushing plant and the handling of tonnage to the introduction of many new standard economies. They introduced the system of selling crushed stone by the net ton. Papers and discussions read before the club have contributed largely to the improvement of the road work of the state.

The most important matter considered was the suggestion of Fred K. Irvine that the club undertake the compilation of a complete set of specifications for the construction of macadam roads. Account would be taken of the different types and kinds of base adapted to the different soils. Different types of specifications would be drawn up for different kinds and amounts of traffic. It was proposed to work out the specifications with great care and detail, in conjunction with the state highway commissioner and finally to place copies of the specifications in the hands of all officials having charge of road work.

Papers were read by Mr. Perry, of Cleveland, representative of the Barrett Manufacturing Company, on "Tar Products for the Binding of the Top Dressing of the Road." Mr. Whitlaw, of the Robeson Process Company, Columbus, read a paper describing "Glutrin and Its Uses." D. W. Seitz, of the state highway department, spoke on "Macadam Roads as They Should Be Constructed." James R. Marker, state highway commissioner, in the course of an address advocating cooperation between the club and the State Highway Department, said that the water-bound macadam section of the experimental road built under the supervision of Mr. Seitz and under standard specifications, had not cost a cent for repairs. Adjoining this was a strip laid at the same time by the city of Columbus. The latter section had been repaired and recoated several times.

Municipal Engineers of the City of New York.

At the regular meeting Wednesday evening, February 26, in the Engineering Societies Building, a paper on "The Highways of Europe" was read by Professor Arthur H. Blanchard, consulting highway engineer, Board of Water Supply. The lecture was illustrated by lantern slides.

Engineers' Society of Western Pennsylvania.

At a meeting in the rooms of the Society, Oliver Building, Pittsburgh, Pa., February 26, Professor James F. Kemp, Columbia University, presented a paper on "The Catskill Aqueduct of New York City." The lecture was illustrated by about 60 lantern slides.

Association for Standardizing Paving Specifications.

After two solid days of deliberation on such solid subjects as concrete, wood block, brick and asphalt paving, and kindred problems, the more than 150 delegates to the fourth annual convention of the Association, together with their ladies, gathered at the Fort Pitt Hotel, Pittsburg, February 27, for an evening of feasting and merriment.

The occasion was the banquet tendered to the visitors by the Chamber of Commerce.

Immediately preceded by an informal reception and get-together meeting in the lobby, the banquet was a peaceful, pleasing scene with the City Councilmen feasting in perfect harmony in company with department heads, with whose estimates they have lately been playing havoc. Chancellor S. B. McCormick of the University of Pittsburg delivered the invocation. When the coffee and cigars came on William S. Brown, chairman of the entertainment committee of the Chamber of Commerce, took the reins as toastmaster and after felicituous remarks introduced Attorney C. K. Robinson, representing the city.

Captain W. J. Hardee, president of the paving association, talked on "New Orleans and Pittsburg" and what the nine-foot stage in the Ohio River will mean to both cities. Norman S. Sprague, superintendent of the Bureau of Construction, also spoke.

The business of the association was concluded on the following day. A trip was made to the Aspinwall filtration plant and in the evening to the Carnegie Institute and the Carnegie Schools of Technology. The visitors also inspected Pittsburg's streets in an automobile tour.

Wisconsin State Highway Commissioners Association.

At a meeting at Madison, Wis., February 21, the Association adopted resolutions protesting against any legislation depriving counties from performing road work under the day labor system. There is a bill before the legislature providing that all road improvement work shall be let by contract. The commissioners are opposed to this bill because they believe that in some counties the cost of road improvement would be considerably more than if it were done under the day labor system. The commissioners were practically unanimous in favor of the present law which authorizes road improvement work to be done under contract or day labor system.

The association went on record as approving the amendments to the state highway law recommended by the state highway commission. It also adopted a resolution favoring a law which would give the county highway commissioner authority to approve or disapprove an ordinance providing for the re-location of a public highway.

Chairman H. J. Kuelling of Milwau-

kee announced the appointment of six standing committees for the ensuing year. The chairmen are as follows.

Drainage—C. J. Morrissett, Superior.

Relocation of roads—G. H. Mainwaring, Gotham.

Concrete and other construction work—T. T. Teall, Sparta.

Bitumen—A. H. Sommers, Blue Mounds.

Legislation—S. S. Crownhart, Ellsworth.

Traffic conditions—J. C. Labram, Madison.

Chairman Kuelling asked all of the commissioners to send him reports of the progress of their work, especially in case the job was unusual. He promised that copies of these reports would be circulated among all of the commissioners who were members of the society.

Former Senator John A. Hazelwood of Jefferson, chairman of the state highway commission, delivered a closing address in which he urged the county commissioners to carry on a campaign of education for good roads improvement. The education of the people of the state on the subject of good roads, he said, was more important than any other thing connected with the roads movement. Fifteen per cent. of the roads of the state bear 85 per cent. of the traffic, he said, and it was important that these roads be improved. It was difficult to convince a taxpayer not residing on these roads that it was to his advantage that such highways be improved. That was one of the tasks of the highway commissioner to perform, said Mr. Hazelwood.

Smoke and Dust Abatement League.

If the plans that are now being discussed by the newly formed Smoke and Dust Abatement League of Pittsburgh, are carried out, that city will be the first city in the United States to have a smoke abatement exhibition. At the last meeting of the league it was decided that for immediate consideration the organization take up the question of smoke appliance exhibition to be held in this city within the next 12 months. The president of the league, William T. Todd, appointed a committee of three on the Plan and Scope of the Exhibition. The members of this committee are Herbert M. Wilson of the United States Bureau of Mines; Raymond C. Benner of the smoke investigation department, University of Pittsburgh, and Arthur A. Hamerschlag, chairman of the smoke prevention committee of the City Planning Commission. Exhibitions of the kind proposed for Pittsburgh have been held in London and Glasgow. These exhibitions covered all classes of factory and domestic appliances for minimizing or reducing smoke. Charts, diagrams and models illustrating different phases of the smoke nuisance were also shown. During the time of these exhibitions, conferences were held by delegates from all parts of the world and lectures were given dealing with the various phases of smoke pollution and abatement. It is proposed to hold the exhibition coincident with the convention of the smoke inspectors of the United States which will meet in Pittsburgh some time in September.

Water Works Manufacturers Association.

The exhibit committee consisting of Fred. S. Bates, L. E. Strothman and Geo. Carr have sent out the following notice:

It is the desire of the Water Works Manufacturers' Association to make the exhibit of the various water works appliances used in connection with the construction of water works, one of the special features of the American Water Works Association's Annual Convention, which is to be held in the City of Minneapolis, Minn., the week beginning June 23, 1913.

We have made arrangements with the manager of Hotel West for the use of the hotel office lobby on the ground floor as exhibit room, thus giving us a large, light, airy room with ample space.

We particularly call your attention to the fact that if it is your desire to have an exhibit at the Convention, you should make your application for space immediately, giving the number of square feet required on floor or table so that we may provide you with table space or floor space only. All tables will be neatly constructed and covered with muslin.

Twenty square feet of exhibit space will be allowed each exhibitor upon payment of annual dues. If more than twenty square feet of exhibit space is desired, there will be an additional charge per square foot. This extra charge cannot be exactly determined until all exhibit expenses are considered, but judging from previous years, the cost will not exceed twenty-five cents per square foot.

No exhibitor will assign, sub-let or apportion the whole or any part of the space allotted, nor exhibit therein, any other goods than those manufactured or sold by the exhibitor in the regular course of business.

Signs will consist of the names of space occupants, and a brief description of goods, illustrating the character of exhibits, size about 18x30 in. In making application for space, please state the lettering or wording you wish on your sign, as we desire to have them uniform and complete on your arrival at Minneapolis.

In shipping exhibits, all goods must be plainly marked and addressed to the American Water Works Associations, care of West Hotel, Minneapolis, Minn. All shipments must be prepaid. Under no circumstances will goods be received on which there are any charges of any kind. The management will not be responsible for loss or damage to the goods consigned in its care. The exhibits will be placed at the various spaces designated at the expense of the management.

Exhibits must not be removed from the exhibit room during the progress of the Convention, except upon written permit from the management.

All points not covered by these rules are subject to the decision of the executive committee.

If you have not applied for space please do so at once, by writing to Fred S. Bates, 180 Broadway, New York City.

Florida Good Roads Association.

The annual convention was held at Eustis, February 28. In the course of his address President W. N. Stinson reviewed the road situation in Florida. He said that during the past year fifteen counties had issued road bonds amounting to $2,500,000. This amount, with that derived from taxation and other resources, it is estimated, had given the State in 1912 about $5,000,000 worth of roads. About 1,000 miles were built during the year. The speaker said there should be three great divisions of road building: Federal, State and county. County roads should be built with the proceeds of bond issues and maintenance by taxation. County roads should connect with State highways and city streets. Concluding, President Stinson urged all members to go to Tallahassee to do all in their power to have the proposed highway bill passed. The framing and discussion of this bill was the main object of the meeting. This bill provides for the formation of a highway commission and the appointment of a chief engineer and assistant.

The election of officers resulted in the selection of J. H. Alderman, of Gainesville, president; Capt. A. B. Dunning, De Land, secretary; J. W. White, Jacksonville, treasurer.

Addresses on the following topics were made at the banquet: Highways and Byways, Dr. W. M. Stinson, president of the Florida Good Roads Association, Jacksonville; Our Highway Bill, Hon. H. B. Philips, county judge of Duval county; Bad Roads, F. O. Miller, member board of governors, Jacksonville; Florida Roads, Fred F. Smith, American Automobile Association, New Jersey; The Automobile and Good Roads Advocate, William Henry Beers; Bricks, J. W. White, treasurer of Florida Good Roads Association and Universal "Jiner"; The Press, Clarence E. Woods, editor of the Eustis Lake Region; The Typical Booster, W. L. Powell, secretary Tampa Board of Trade.

Iowa Engineering Society.

At the annual meeting, Sioux City, February 21, the following officers were elected: Dean W. G. Raymond, Iowa City, president; J. H. Mayne, Council Bluffs, vice president; F. S. Delay, Creston, and W. H. Kimball, Davenport, directors. Ft. Dodge or Council Bluffs will be selected as the 1914 meeting place by mail vote.

Oregon Society of Engineers.

The following were elected officers of the society at the annual meeting, Portland, February 13: W. H. Graves, president; W. H. Crawford, vice-president for the term ending in 1916; State Engineer John H. Lewis, vice-president for the term ending in 1914; O. E. Stanley, secretary, and Henry F. Blood, re-elected treasurer. On the executive committee, D. C. Jenny, J. R. Thompson, F. A. Naramore, Douglas W. Taylor and H. L. Vorse were chosen. The standing nominating committee elected is: Fred. A. Ballin, C. E. Condit, Robert S. Edwards, L. C. Kensey, E. I. Newcomb, Frederick Powell, L. W. Thompson, and Fred. I. Webber. About 100 engineers and their guests sat down to dinner.

Indiana Sanitary and Water Supply Association.

At the convention, Indianapolis, Ind., February 25-26, the following officers were elected: Dow R. Gwinn, Terre Haute, president; Howard Dill, Richmond, first vice-president and chairman water works management and accounts committee; H. E. Barnard, Indianapolis, second vice-president and chairman legislative and legal decisions committee; Charles Brossman, Indianapolis, third vice-president and chairman stream pollution and sewage disposal committee; Dr. H. G. Morgan, Indianapolis, fourth vice-president and chairman water purification committee; E. L. Loomis, Valparaiso, fifth vice-president and chairman water works devices and machinery committee; Dr. W. F. King, Indianapolis, secretary-treasurer; W. G. Ulrich, Indianapolis, assistant secretary-treasurer. The program committee is composed of Dr. W. F. King, H. E. Barnard, F. and C. Jordan.

American Society of Civil Engineers, San Francisco Chapter.

H. A. Campbell, engineer for the bureau of inspection, San Francisco Chamber of Commerce, adddressed the San Francisco members of the American Society of Civil Engineers at their bi-monthly meeting and banquet at the Palace Hotel, February 21. His subject was "Some Glimpses and Criticisms of Public Work in San Francisco," which he illustrated with stereopticon views. C. B. Wing, president of the local association, delivered his annual address before sixty members.

New England Water Works Association.

The March meeting of the association will be held at Hotel Brunswick, Boston, March 12. A paper on "Quantitative Estimation of Ground Waters for Public Supplies" will be presented by Myron L. Fuller, geological engineer, Boston. The committee composed of Leonard Metcalf, chairman, Frank L. Gifford and William F. Sullivan will make a report "On Water Consumption and Statistics Relating Thereto." The discussion will be opened by Arthur F. Ballou, Superintendent Water Department, Woonsocket, R. I.

The annual convention will be held in Philadelphia, September 10-12. The headquarters will be at Hotel Walton.

PERSONALS

Closson, Edgar S., recently Assistant Engineer Public Service Commission, New York City, has been appointed Town Supervisor of Montclair, N. J.

Decker, John L., Dunmore, Pa., has been re-elected Chief of the Fire Department.

Brown, George M, Princeton, N. J., has been appointed Superintendent of Public Works of Princeton. This office combines the former ones of Street Commissioner and Borough Engineer. Mr. Brown is a graduate in civil engineering of Princeton University.

Fawkes, A. W. E., Minneapolis, Minn., is Engineer in Charge of Waterworks of Calgary, Alta. Mr. Fawkes was formerly connected with the construction of the mechanical filtration plant of the Minneapolis waterworks.

Harding, Major Chester, Corps of Engineers, U. S. A., Assistant Division Engineer of the Atlantic Division of the Panama Canal, has been appointed Engineer Commissioner of the District of Columbia.

MUNICIPAL APPLIANCES

Monarch Tandem Roller.

The Good Roads Machinery Co., Inc., Marathon, N. Y., has filled out its line of road machinery by the addition of a tandem roller, the Monarch, made in three sizes, five, eight and nine tons. The manufacturer states that the roller has been designed by expert engineers of ripe experience, that scrupulous care has been given to the details of the design and only the best materials have been used.

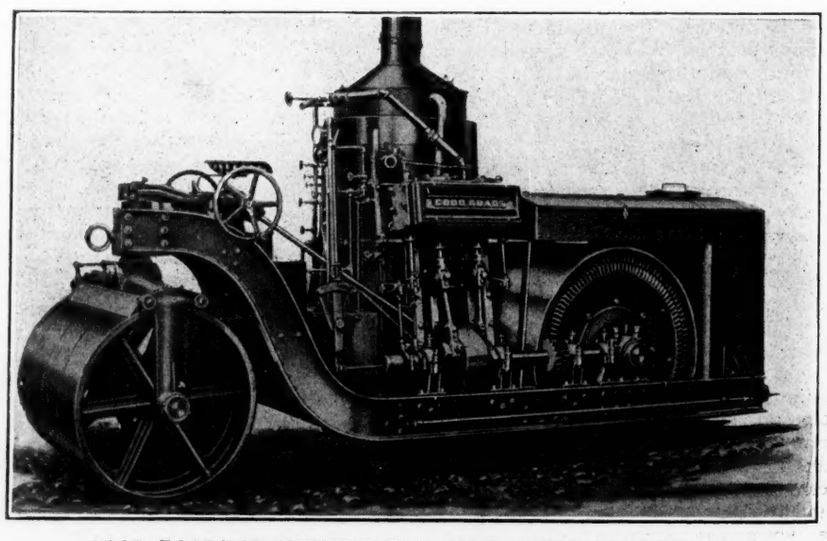
The side and cross frames are built of steel channels of extra heavy section. They are bent to the required shape in one piece, thus obviating the weakness of connections. There are reinforced under the compression roll bearings by heavy steel plates.

The boiler is placed midway between the two longitudinal frame sections, near the rear roll, and securely fastened to the frame. It is of the vertical tubular type, claimed to be larger than those used on any other make of tandem roller of the same size. The large heating surface makes it a rapid, easy and economical steamer. The boiler is made of open-hearth flange and firebox steel. The shell is of double strap construction. All plates and the heads are firmly riveted together. The tubes are of seamless cold-drawn tubing, beaded at both ends. All boilers are tested at 250 pounds per square inch hydraulic pressure. Gates are of the stationary type. The boiler lagging is of asbestos covered with Russia iron.

The engine is of the double cylinder type, with cast iron piston heads, packing rings, crossheads, eccentric straps, and with eccentrics cast on reversing sleeve. Connecting rods are of forged steel with suitable adjustment to take up wear on phosphor bronze bearings at crankshaft and wristpin ends. The crankshaft is of forged steel carefully machined.

The gears on the compression roll are of cast steel of the step tooth type. This gives the roller promptness in action in starting and reversing and delicacy of control. The large gear is secured to the roll head by through bolts and the pinion is keyed to the crankshaft.

The tire and flanged heads of the compression roll are made of soft steel



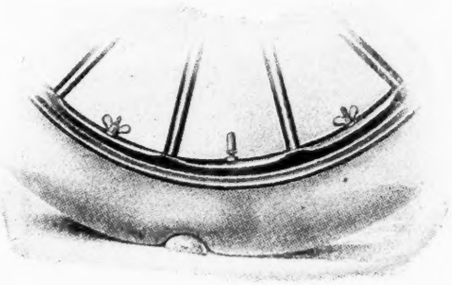
GOOD ROADS MACHINERY CO.'S NEW TANDEM ROLLER.

plates, thoroughly riveted together; the flanged heads being securely bolted to the extended flanges of the counterweight which is cast on the axle. The face of the roll is turned smooth and perfectly round.

The steering roll is made in four sections of cast iron, making the roller easy to steer. The hubs are bored and the rims are faced and turned smooth and round. The steering roll is supported on a steel axle which is fitted to the cast steel yoke.

The power steering device is operated by a lever which brings a friction wheel in contact with the flywheel of the engine and transmits motion to the worm shaft by means of bevel gears and vertical shaft. The hand steering device has wheels on both sides.

Minor devices and equipment have been provided with the same care as that given to the main parts. Automatic adjustable scrapers have been provided for both sides of both rolls. Two injectors are provided for feeding the



DAYTON TIRE PASSING OVER STONE

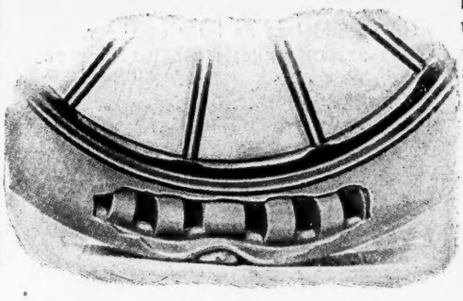
boiler. There is a sprinkler ahead of the compression roll. All bearings have compression grease cups. A one-quart oil cup is supplied for cylinder lubrication. A strong and durable draw bar is fastened to the front end of the machine. This is provided with clevis and coupling pin. For attaching to the near end of the machine is a large eyebolt in the king post housing. The yoke carrying the bearings of the small wheel is of cast steel.

The operator when on the seat is within easy reach of all the adjusting devices, namely: the throttle valve, reverse lever, steering lever, steering hand wheel, gauge cocks, water gauge, injectors, oil pump, blower, sprinkler and cylinder cock lever.

Dayton Airless Tire.

The Dayton Airless tire is based on principles well recognized in other branches of engineering. The principle is that of a bridge with its piers. A wheel is built on the same lines. Similarly a Dayton airless tire is constructed of piers or spokes of rubber and an annular rib of straight cut fabric and rubber. A tire, however, if it did not ride smoothly would be valueless as an automobile tire. To understand this it must be born in mind that rubber is a non-compressible substance. Rubber, however, when pressed is displaced. When pressure is removed the rubber returns to its original position.

The practical application of these



DAYTON TIRE DISSECTED TO SHOW CONSTRUCTION.

fundamental principles is this: The function of a rubber tire is to absorb small and lessen the shock on large obstructions. When a Dayton Airless tire strikes a stone, the stone sinks into the tire, rubber is displaced and the pier or column of elastic high grade rubber squeezes down and bulges out into the open spaces between the piers and the tire passes over the stone with a very slight vibration or bounce.

Properly vulcanized pure rubber will stretch to seven times its own length without breaking and return to its original shape when released. The piers of rubber in the Dayton Airless are vulcanized, moulded or baked, so as to unite and become a unit with the casing.

Farquhar Gasoline Tractor.

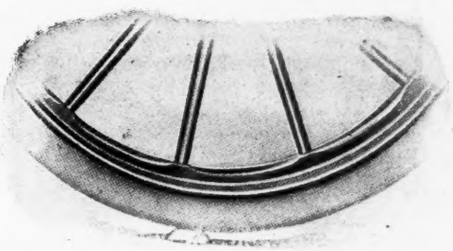
Transportation by tractor and train of wagons is admitted to be the cheapest known method of moving bulky materials such as are used on road work. Whether a steam traction engine or a gasoline tractor should be used is a matter of opinion under some circumstances. In locations where water is scarce, the gasoline tractor has a decided advantage, as the cost of hauling water, always an appreciable item becomes prohibitive.

The A. B. Farquhar Company, Ltd., York, Pa., make the tractor shown in the illustration. As the machine is built for heavy work, steel gears are used exclusively and balance of the construction all through is made abundantly strong so as to stand up to the heavy duty required of an engine in this work. The rear wheels are 84 inches in diameter; front wheels 48 inches in diameter. Fifth wheels and front cross piece on the frame are all solid steel castings, as well as cap on top of the axle. Draw bar is attached securely to the rear of the frame. There are two gasoline tanks on top of the water cooler, each having a capacity of 30 gallons. Oiling is by splash system with pump and reservoir. Ignition is by Remy heavy duty ball-bearing magneto. The carburetor is the Kingston 2 inch.

Following are specifications of the two vital points—motor and transmission.

Cylinders—Number 4. Cost in pairs from best grade charcoal iron. Bore, 6 inch. Stroke, 8 inch.

Cylinder Heads—Detachable. Cast

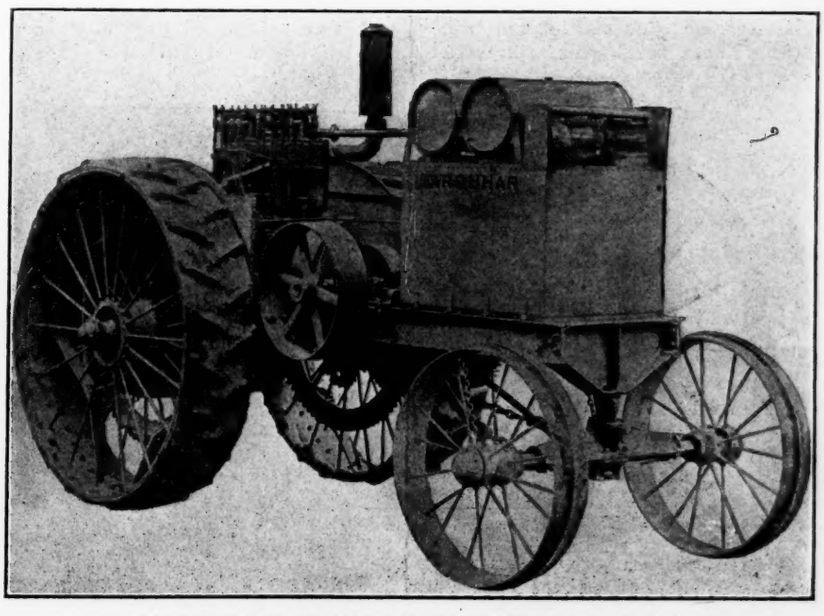


ORDINARY PNEUMATIC PASSING OVER STONE.

in pairs. Valves in head surrounded by water.

Valves—Poppet type. Overhead construction. Drop forged solid piece. Operated through rocker arms and push rods. All points of contact are hardened.

Crank Shaft—Vanadium steel. Hammer forged. Machined oil treated and ground. Fly wheel flange forged solid to shaft.



GASOLINE TRACTION ENGINE FOR ROAD WORK.

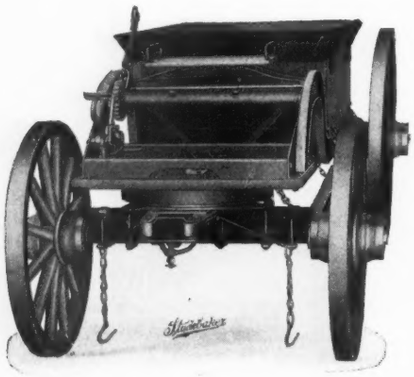
Crank Bearings—Three 2¾ inch diameter; length centre bearing 6 inches length end bearings, 7½ inches.

Crank Pins—Diameter, 2⅞ inches; length, 5 inches. Revolutions per minute, 500 to 550.

Ignition—Jump spark. Remy, three magnet, ball bearing, R. F. heavy duty type magneto. Dry cells for starting.

Fuel Control—Kingston Carburetor. Throttling ball governor connected to carburetor.

Oiling System—Splash method and kept in circulation through an oil pump capable of delivering 1¼ gallons per minute.



FRONT—SHOWING MANNER IN WHICH FRAME AND BODY ARE BRACED.

Cooling System—Tank with capacity of 250 gallons of water at front end of engine. Water circulated through engine by a pump having a capacity of 16 gallons per minute.

Transmission.—The transmission is the bevel gear drive and operated through friction clutches to get the backward and forward motion. There is a bevel pinion fastened to the end of crankshaft which drives two bevel gears, one on each side which (bevel gears) are bolted fast to friction drums, one on each side of center of motor. These bevel gears run in an oil bath continually, and with proper care should last as long as the motor. They are of nickel steel, machine cut, heat-treated and ground. The transmission is operated by one lever for both backward and forward motions.

Transmission Shaft—2¾ inches in diameter.

Belt Pulley—Diameter 32 inches; face, 9 inches; revolutions per minute, 250 to 275.

Gears—Cast steel. Width of face of engine pinion, 4 inches; differential; 4 inches; master pinions, 4½ inches; master gears, 4½ inches.

Drive Wheels—Diameter, 7 feet; width, 20 inches; extension rims, extra. Round spokes. Cast iron hub, brass bushed. Reinforced on edges with 2½x¾-inch band.

Front Wheels—Diameter, 48 inches; width of face, 9 inches.

Rear Axles—Stationary. I-beam section cast steel. Rigid. Spindles machined to fit brass bushing in hubs of drivers.

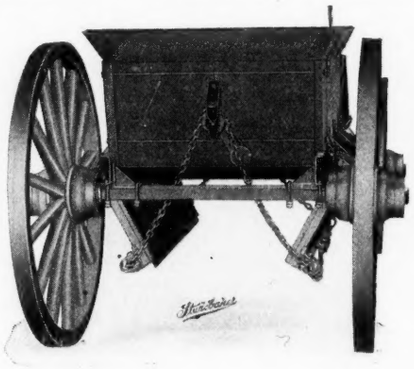
Speed—Speed of engine, 2-3-10 miles per hour. Approximate shipping weight, 8 tons.

Steel Frame Wagon.

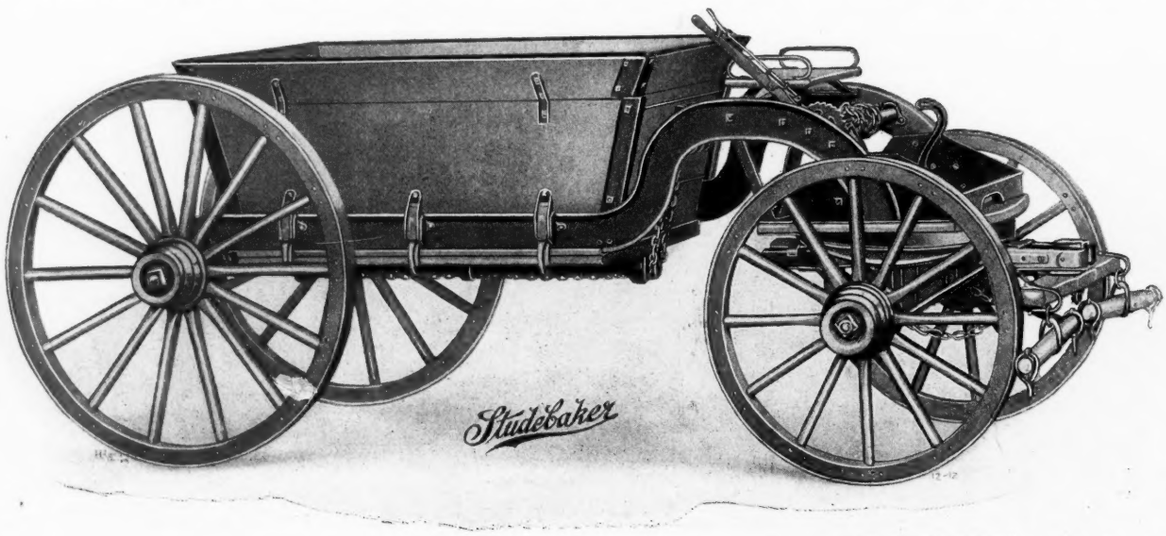
The Studebaker Corporation has placed on the market a new contractor's bottom dump wagon built on the general plan of their standard wagon but having a steel frame, "built like a bridge," as O. S. Barrett of the publicity department says. The steel frame consists of steel channels one on each side extending from the rear axle along the bottom of the body to a point above the front axle. The channels are bent to allow the front wheels to cut under in the usual way. The axles are either bar or steel. The front axle is 2 inches square, the rear 2¼. The front wheels are 42 inches in diameter, the rea 54. The standard tire is 3 by ⅝-inches. The total weight of the wagon is 2,100 pounds, the same as that of the "New Ideal" wooden frame wagon. The capacity is 1½ cubic yards. The height from the ground to the top of the bed is 4 feet 3 inches; above the bed are wings, 6 inches high. By adding a hinged top box the capacity is 2 yards.

The body is hardwood, mounted on and securely attached to the steel frame. The sides are 1½ inches thick, dovetailed and glued. Iron bands protect the edges of both sides and wings. The doors are covered with steel with an overlapping strip in the center and with angle steel strips along the sides and ends extending up on the outside of the body.

The gear is full cut-under, permitting the wagon to turn in its own length. There is a full circle oscillating fifth wheel, 28 inches in diameter, which allows a front wheel to drop into a depression or pass over an obstacle without disturbing the level of the body. The wheels have New England birch hubs, white oak spokes and rims. The rims are riveted on each side of the spokes. The wheelbase is 8 feet 6 inches for the narrow track and 8 feet 8 inches for the wide track. The pole is either drop or stiff, with neck yoke or chains. The seat has springs and hand holds on the ends. Extra equipment includes brake, steel lining, steel and asbestos lining, three bore hitch, extra widths and thickness of tire and a hinged top box.



REAR—SHOWING MANNER IN WHICH SILLS ARE ATTACHED TO AXLE.



SIDE VIEW OF NEW STEEL FRAME CONTRACTOR'S BOTTOM DUMP WAGON.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards.

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS	
Ill.,	Lawrenceville	2 p.m., Mar. 8.	Macadamizing State road	D. Hipsher, Comr.
Ia.,	Cedar Rapids	Mar. 8.	Concrete in alley, curb and gutter several streets	J. L. Story, City Clk.
Ia.,	Cedar Rapids	Mar. 10.	Brick and wood block several streets	J. L. Story, City Clk.
O.,	New Waterford	Mar. 10.	Paving	City Clerk.
Md.,	Frederick	Noon, Mar. 10.	One mile road	L. G. Dinterman, Pres. Comrs.
Ia.,	Burlington	Mar. 10.	Brick, 15 blocks; concrete, 4 blocks	H. G. Volmer, C. Clerk.
La.,	Natchitoches	Mar. 10.	Gravel, 20,000 sq. yds.	G. W. Kyle, Mayor.
Ill.,	Rossville	9 a.m., Mar. 10.	Brick, 30,000 yds.	Town. Clerk; Hayne & Barr, Engrs., Danville.
D. C.,	Washington	2 p.m., Mar. 10.	Grading 17,000 cu. yds.	C. H. Rudolph, Comr.
Tex.,	Houston	Noon, Mar. 10.	Bitulithic pavement	D. C. Smith, Jr., City Sec.
Tex.,	Bay City	Mar. 10.	Mud shell, 20,000 cu. yds.	W. C. Lloyd, Co. Clerk.
Sask.,	Regina	Mar. 10.	Paving in car tracks 40,000 yds	R. Martin, Chrmn. Comrs.
Tex.,	Palacios	Mar. 10.	Shell road, 30 miles	J. H. Elvage, Engr.
Tenn.,	Bluff City	1 p.m., Mar. 10.	Macadam, 50 miles	W. D. Lyon, Chrmn. Com.
Ky.,	Franklin	Noon, Mar. 10.	Macadamizing Lincoln-Jackson Way	I. H. Goodnight, Chrmn. Com.
N. J.,	Jersey City	2 p.m., Mar. 10.	Road oil, 50,000 gals. Improving street; repaving viaduct	E. B. See, Clk.
Pa.,	Edgewood	4 p.m., Mar. 10.	Hillside brick, 1,520 lin. ft.	R. F. Shannon, Chrmn. Com.
Cal.,	Los Angeles	2 p.m., Mar. 10.	Furn. 56,000 bbls. asphaltic petroleum	H. J. Leland, Clerk.
Ont.,	Toronto	Noon, Mar. 11.	Refined asphalt, 12 asphalt wagons	H. C. Hocken, Mayor.
Ohio,	Sidney	Mar. 11.	Paving, all materials, 66,000 yds.	O. D. Warner, Dir. P. S.
Ia.,	Clinton	8 p.m., Mar. 11.	Concrete paving, several sts.	E. M. Howes, Mayor
Ore.,	Dalles City	Mar. 11.	Bit. asphaltic concrete, Dolarway or Hassam, 30,000 yds.	C. L. White, C. Engr.
Ia.,	Hampton	Mar. 11.	Concrete paving, cost $65,000	F. G. Luke, C. Clerk.
O.,	Deshler	Noon, Mar. 11.	Brick drainage, &c.	A. F. Samsell, Vil. Clerk.
Ill.,	Chicago	4 p.m., Mar. 11.	Asphalt cement, 1,000 tons	G. A. Mugler, Sec. Com.
O.,	Newark	Noon, Mar. 12.	Standard pavement, any kind, 52,000 yds.	C. H. Wells, C. Engr.
N. Y.,	Buffalo	11 a.m., Mar. 12.	Paving and repaving	F. G. Ward, Comr.
Ohio,	Cleveland	11 a.m., Mar. 12.	Imp. road	J. F. Goldenbogen, Clerk.
D. C.,	Washington	2 p.m., Mar. 14.	Resurfacing with macadam	W. M. Hays, Act. Secy.
Va.,	Richmond	Mar. 14.	Smooth paving, cost $80,000	C. E. Bolling, C. Engr.
Tenn.,	Morristown	Noon, Mar. 14.	Sheet asphalt, 16,000 yds.	D. C. Morris, C. Recorder.
O.,	Medina	Mar. 15.	Imp. river road, 7,400 ft.	Ira Waldo, Township Clerk.
Pa.,	Oil City	Mar. 15.	Wood block, 5,200 yds., cost $12,000	G. F. Roess, City Engr.
Wis.,	Watertown	2 p.m., Mar. 15.	Reinforced concrete pavement, 3 sts.	A. Kraeft, Ch. Bd. Pub. Wks.
Ont.,	Welland	Noon, Mar. 15.	Concrete sidewalks, 33 miles	G. R. Boyd, Town Clerk.
Kan.,	Anthony	2 p.m., Mar. 15.	Concrete curb and gutter, 40,000 lin. ft.	W. A. Miller, Mayor.
Wyo.,	Sheridan	10 a.m., Mar. 17.	Wood, bitulithic, asphalt, &c., 21,800 yds.	J. J. Witherow, City Clerk.
Minn.,	Minneapolis	11 a.m., Mar. 17.	Grading	A. P. Erickson, Co. Aud.
S. D.,	Aberdeen	10 a.m., Mar. 17.	Creosoted block, brick or concrete	F. V. Raymond, C. Aud.
Ala.,	Birmingham	3 p.m., Mar. 18.	Asphalt, bitulithic, bituminous concrete, wood block, concrete, 55,000 sq. yds., cost $250,000	W. G. Kirkpatrick, C. Engr.
N. Y.,	Brooklyn	11 a.m., Mar. 18.	Asphalt several streets	A. E. Steers, Boro. Pres.
Mo.,	St. Louis	Mar. 18.	Brick, asphalt, bitulithic, telford oil treatment	Bd. Pub. Improvements.
Ohio,	Minster	Mar. 19.	Paving, 40,000 yds.	L. W. Schneider, Vil. Clerk.
Ia.,	Washington	Mar. 19.	Dolarway, 12,000 yds.	Iowa Engr'g. Co., Clinton.
Ohio,	Bellaire	Noon, Mar. 19.	Bituminous macadam, glutrin macadam, &c	W. J. Campbells, Twp. Clerk.
Ohio,	Cleveland	11 a.m., Mar. 19.	Imp. road	J. F. Goldenbogen, Clerk.
Minn.,	Marshall	10 a.m., Mar. 19.	Grading state road	E. S. Shepard, Co. Aud.
Ill.,	Monmouth	Mar. 21.	Vit. brick, 5,800 sq. yds.	J. P. Moore, Mayor.
Mo.,	Kansas City	2 p.m., Mar. 21.	Asphaltic cement, refined asphalt or refined asph. & flux	A. C. Wright, Purch. Agt.
N. J.,	Millville	8 p.m., Mar. 21.	Brick, 21,000 yds.	L. H. Hogate, C. Recorder.
Ala.,	Opelika	Mar. 21.	Dolarway brick, wood, asphalt, &c., 50,000 sq. yds.	S. S. Black, C. Clerk.
Ohio,	Archbold	Mar. 22.	Paving, 9,000 yds.	J. H. Fagley, Vil. Clerk.
Pa.,	Chambersburg	8 p.m., Mar. 24.	Paving, 15,700 yds.	C. H. Paterson, Boro. Clk.
Minn.,	Minneapolis	11 a.m., Mar. 24.	Gravel, 17,000 lin. ft.	A. P. Erickson, Co. Aud.
Wash.,	Fort Flagler	11 a.m., Mar. 25.	Granolithic sidewalks	H. O'Leary, Q. M.
Ia.,	Mt. Vernon	Mar. 25.	Brick, wood block, asphalt or concrete	Iowa Engr'g. Co., Clinton.
Ind.,	Bloomfield	Mar. 25.	Brick, 2 miles, cost $32,000	City Clerk.
Sask.,	Saskatoon	Noon, Mar. 28.	Pavement, concrete walks, curbs, gutter, &c	F. E. Harrison, Mayor.
Alta.,	Calgary	Mar. 29.	Concrete about reservoir	A. S. Dawson, Chief Engr.
Pa.,	Monongahela	Apr. 1.	Brick, 8,000 sq. yds. Cost, $12,000	J. A. Morrow, C. Eng.
Ga.,	Washington	Apr. 2.	Pavement, 20,000 sq. yds.	Jaudin Engr. Co., Savan., Ga.
Fla.,	Bartow	Noon, Apr. 7.	Macadam	J. A. Johnson, Clerk Comrs.
Ind.,	Logansport	Apr. 9.	Macadam roads	J. E. Wallace, Co. Aud.
			SEWERAGE	
Ia.,	Sioux City	Mar. 8.	Clay pipe sewer	F. C. Smith, City Engr.
Ia.,	Toledo	7 p.m., Mar. 10.	Disposal plant and outlet sewer	J. M. Lichty, C. Clerk.
Ind.,	South Bend	Mar. 11.	Bowman Creek sewer	Board of Pub. Works.
N. J.,	Newark	Mar. 11.	Main sewer two parts, 3,000 & 2,600 ft., respectively	Passaic Sewerage Comm.
Ore.,	Dalles City	Mar. 11.	Laterals, 15,000 ft. 6 to 12-in.	C. L. White, C. Engr.
O.,	Sidney	Mar. 11.	Storm sewers, 8 to 24-in.	D. H. Warner, Dir.
O.,	Columbus	Mar. 11.	Main and lateral sewers	S. A. Kinnear, Dir. P. S.
Ont.,	Brantford	Noon, Mar. 13.	Sewer pipe for 1913	T. H. Jones, City Engr.
Tenn.,	Martin	2 p.m., Mar. 14.	Pipe sewers, 50,000 ft. 8 to 15-in.	J. H. Wilson, Recorder.
Tex.,	Pecos	Mar. 15.	Sewer system, cost $35,000	City Clerk.
Ohio,	Conneaut	Noon, Mar. 17.	Sanitary sewer, 2,000 ft. 8-in. septic tank	A. W. Pelton, Dir. Pub. Serv.
Wyo.,	Sheridan	10 a.m., Mar. 17.	Storm sewers	J. J. Witherow, City Clerk.
D. C.,	Washington	2 p.m., Mar. 17.	Sewers	C. H. Rudolph.
Ill.,	Edwardsville	3 p.m., Mar. 17.	Furn. 8,000 ft. 8 to 15-in. sewers	N. O. Nelson Mfg. Co.
Mich.,	Ludington	1 p.m., Mar. 17.	Vitrified pipe, 3,500 ft.	Dean Thompson, C. Clerk.
Kan.,	Burlingame	Mar. 18.	Clay pipe sewers	J. J. Griffin, City Clerk.
Ont.,	Bowmanville	8 p.m., Mar. 19.	Sewerage system	John Lyle, Town Clerk.
Wis.,	Deer Creek	Mar. 20.	Town ditch, 19,200 ft.	Chas. Murray, Town Clerk.
N. J.,	Secaucus	Mar. 25.	Sewer system	S. Maulbeck, Boro. Engr.
La.,	Lafayette	Mar. 27.	Franchise for sewer system	C. D. Boudreaux, Chr. Com.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
WATER SUPPLY				
Ia.,	Muscatine	9 a.m. Mar. 10.	Reservoir	T. R Fitzgerald, Sec. Trustee.
Tenn.,	Kenton	Mar. 11.	Water works and electric lighting plant	R. C. Houston & Co., Memphis, Engrs.
O.,	Akron	Noon, Mar. 11.	Pig lead and lead pipe	R. M. Pillmore, Dir. P. S.
Wis.,	Boscobel	8 p.m., Mar. 12.	Drilling well, furn. 300 tons c.-i. pipe, reservoir	H. J. Johnson, C. Clerk.
N. Y.,	New York	2 p.m., Mar. 12.	Auxiliary pumping station, furn. c.-i. pipe, valves, lead, &c.	H. S. Thompson, Comr.
Ont.,	Sarinia	Mar. 15.	Water works, cost $240,000	R. A. McLean, C. Engr.
Ia.,	Burlington	Noon, Mar. 15.	Clear water basin	Citizens' Water Co.
Ont.,	Sarnia	8 p.m., Mar. 15.	Pumping station and main	J. A. Bell, Mayor.
Sask.,	Swift Current	Noon, Mar. 17.	C.-i. pipe, 600 tons; valves, hydrants, &c.	G. D. Mackey, Town Engr.
Conn.,	Meriden	Noon, Mar. 18.	Dam, reservoir, pipe laying, &c.	W. S. Clark, Supt.
Ont.,	Bowmanville	8 p.m., Mar. 19.	3 reservoirs, water mains, hydrants, valves, &c.	John Lyle, Town Clerk.
Mich.,	Saline	Mar. 20.	Water works	A. J. Warren, Vil. Clerk.
Ark.,	Sulphur	2 p.m., Mar. 20.	Power house, pump house, elec. equip., mains, standpipe	C. J. Williams, Chr. Bd.; A. C. Moore, Engr., Joplin, Mo.
N. Y.,	West Winfield	Apr. 1.	Water works	H. C. Hackley, Clk.; W. G. Stone & Son, Engrs., Utica.
Okla.,	Hinton	About Apr. 1.	Water works and lighting plant	Benham Engr. Co., Okla. City.
Ky.,	Madisonville	Apr. 2.	C.-i. pipe, steel tank, sewers	W. J. Dulin, Sec. Bd. P. Wks.
Hayti,	Port au Prince	Apr. 3.	Water works, cost $400,000	Dept. Travaux Publiques.
N. J.,	Jersey City	Apr. 15.	Steel concrete conduit, cost $500,000	C. A. Van Kuren, C. Engr.
Sask.,	N. Battleford	Apr. 15.	Steel water pipes, valves, hydrants, &c.	Sec.-Treas.
Sask.,	N. Battleford	8 p.m., Apr. 15.	C.-i. and steel water mains, hydrants, &c	D. S. Walker, Mayor.
LIGHTING AND POWER				
Tex.,	Galveston	11 a.m., Mar. 11.	Ornamental incandescent posts, 57, 5-lights	J. M. Murch, Co. Aud.
Ind.,	Kendallville	Mar. 11.	Power plant, cost $10,000	City Clerk.
Tenn.,	Kenton	8 p.m., Mar. 11.	Generator, 50-k.w. engine, street lighting system, &c.	M. C. Rossen, Mayor.
B. C.,	Duncan	Mar. 13.	Water turbines, generators, transformers, &c.	City Clerk Greig.
Ill.,	Chicago	Mar. 13.	Street lighting equipment	J. McGillen, Clerk San. Dist.
Sask.,	Regina	Noon, Mar. 15.	Power house equipment; 500 h.-p. water tube boilers	E. W. Bull, Supt. Lt. & Power.
Sask.,	Swift Current	Noon, Mar. 17.	Sinking gas well	G. D. Mackie, Town Engr.
Fla.,	Gainesville	4 p.m., Mar. 17.	Electric light system and water works	H. E. Taylor, Ch. Bd. P. Wks.
Sask.,	Regina	Mar. 18.	Water tube boilers, 6 500 h.-p., stokers, super-heaters, &c.	E. W. Bull, Supt.
D. C.,	Washington	Mar. 22.	Generator, 200-k.w., switchboard, &c., for Pearl City, T. H.	Navy Dept.
La.,	New Orleans	3 p.m., Apr. 18.	One 150 h.-p. motor, contract 54-D	F. S. Shields, Sec. S & Wtr. Bd.
Chile,	Santiago	Sept. 10.	Illuminating plant for port works	Comision de Puertos.
FIRE EQUIPMENT				
Col.,	Denver	Mar. 8.	Fire hose, 10,000 ft.	Comrs. of Supplies.
N. Y.,	Brooklyn	10.30 a.m., Mar. 10.	Fire house	Josh. Johnson, Comr.
N. J.,	Jersey City	2 p.m., Mar. 10.	Fire hydrants	E. B. See, Clk.
Alta,	Edmonton	Noon, Mar. 10.	Three motor comb. wagons, two motor engine & hose, one motor hook & ladder truck, one 90 HP. tractor, one horse drawn hose wagon, 5,000 ft. 2½ (in. hose play pipes, connections, etc	City Comrs.
Ill.,	Aurora	2 p.m., Mar. 10.	Motor combination hose and chemical	John Fenton, Chrmn.
N. Y.,	Schenectady	2.30 p.m., Mar. 12.	Triple comb. chemical pumping engine & hose auto	F. E. Johnson, Sec.
N. Y.,	Potsdam	7.30 p.m., Mar. 14.	Fire engine house	F. A. Weed, Vil. Clerk.
Tex.,	Austin	Noon, Mar. 17.	Motor comb. hose and chemical wagon	J. P. Hart, Supt. Pub. Safety.
D. C.,	Washington	3 p.m., Mar. 17.	Fire alarm system for warehouse	Supervising Architect.
Ill.,	Freeport	Mar. 17.	Motor apparatus, aerial ladder, combination pump and chemical, combination hose and chemical	City Clerk.
BRIDGES				
O.,	Carrollton	Mar. 8.	Concrete bridge	Co. Auditor.
Tex.,	San Angelo	10 a.m., Mar. 11.	Concrete bridge	County Clerk.
Okla.,	Lawton	6 p.m., Mar. 14.	Six bridges	County Comrs.
Va.,	Richmond	Noon, Apr. 15.	Concrete bridge and viaduct approaches	C. E. Bolling, City Engr.
N. Y.,	Minetto	About Apr. 15.	Reinforced concrete bridge	Concrete Steel Engr. Co., N. Y.
Pa.,	Chester	Mar. 17.	Concrete bridge	City Clerk.
N. Y.,	Albany	Noon, Mar. 18.	Arch Aqueduct at Medina	D. W. Peck, Supt. Pub. Wks.
Pa.,	Butler	Noon, Mar. 22.	Four concrete bridges	W. B. Scott, Co. Aud.
MISCELLANEOUS				
Ore.,	Portland	Mar. 10.	Portland cement, 100,000 bbls.	Major J. J. Morrow.
Alta.,	Calgary	5 p.m., Mar. 10.	Street sprinklers	J. M. Miller, C. Clerk.
Mo.,	Kansas City	2 p.m., Mar. 11.	Refuse disposal plant, 75 tons capacity	E. J. McDonell, Sec.
Ohio,	Sandusky	Noon, Mar. 11.	Motor patrol wagon, cost $2,500	J. C. Hauser, Dir. Pub. Safety.
N. J.,	Mt. Holly	11.30 a.m., Mar. 12.	10-ton steam or gasoline roller	Freeholders.
Mass.,	Worcester	Mar. 14.	Cement, 25,000 bbls.	M. Gault, Supt. Sewers.
Ky.,	Louisville	Noon, Mar. 15.	Poor house, reservoir heating and pumping plant	D. B Davis, Co. Clerk.
Ill.,	Aurora	2 p.m., Mar. 15.	Motor combination patrol and ambulance	M. F. Smith, Chrmn.
S. C.,	St. Matthews	Noon, Mar. 16.	Court house and jail	J. S. Wannmaker, Chr. Com.
Pa.,	Chester	8 p.m., Mar. 17.	Concrete retaining walls, &c.	W. Provost, Jr., Chr. Com.
N. Y.,	New York	11 a.m., Mar. 18.	Concrete tile roofs, five superstructures	Chas. Strauss, Pres. Bd.
Fla.,	Pensacola	Noon, Mar. 21.	Wharf	L. E. Thornton, C. Engr.
Roumania,	Piatra	Mar. 26.	Abbatoir, cost $35,000	No. 10470 Bu. Mfs., Wash, D.C.
D. C.,	Washington	Mar. 26.	Plans for closed dump carts, 6 cu. meters capacity	No. 10409, Bureau of Mfrs.

STREETS AND ROADS

Albertville, Ala.—Work is to be started very shortly on highway from Boaz to Albertville. People of each place subscribed $500 to project, making $1,000, county commissioners appropriated $1,000 to work and state good roads fund will be drawn on for $2,000, making $4,000 for building of road. It has been stated here that proposed bond issue of $130,000 for road improvement in Marshall county will probably carry. Date for the election has not yet been set.

Birmingham, Ala.—Opening of new North and South st., from Fifth ave. to Ave. G south, is under consideration.

Guntersville, Ala.—Bond issue for $130,000 for main roads of county is being discussed. Election will probably be held in March.

Oneonta, Ala.—Bond issue for good roads is recommended.

Phoenix, Ariz.—Resolutions have been passed for improvement of portion of McDowell road and intersecting streets.

Berkley, Cal.—Street improvements in Berkley involving expenditure of upwards of $50,000 have been recommended by Berkley Improvement Committee of City Council. Estimates have not been obtained on part of program, but when completed are likely to bring aggregate well above $40,000. Committe would spend $8,810 on Maple ave., west of Main st.; $15,910 on Berkley ave., between Main st. and Magnolia Cemetery gate; $8,712 on Liberty st., between Lee and Main sts. Plans contemplate improving Maple ave. east of Main st., as well as west.

Colusa, Cal.—Paving work has been ordered on Market st., from First to Twelfth, and Fifth from Main to Oak sts.

Richmond, Cal.—City Council has planned about 5 miles of street paving.

San Mateo, Cal.—Since San Maeto branch of Bank of Italy, the German Savings and Hibernia Savings and Loan Society have agreed to buy $200,000 bonds of State highway, proposed stretch of road from San Mateo to boundary line of Santa Clara County will be completed before 1914.

Delaware City, Del.—Senate has passed bill authorizing Delaware City to borrow $10,000 for street improvement.

New Castle, Del.—Senate has passed bill authorizing New Castle to borrow $30,000 for street improvement.

Jacksonville, Fla.—Pearl st., from Fourth st. to the city limits, will be paved with asphaltic concrete, if recommendations of Pearl Boulevard Association are carried out.

Jacksonville, Fla.—Frank Brown, Clerk of Circuit Court, has been authorized to advertise for bids to be received on or before March 26 for sale of last $250,000 installment of million-dollar bond issue for good roads.

Jacksonville, Fla. — Committee has agreed to recommend to city Council widening and relaying of sidewalk on Laura st., from rear of Barnett Bank Building to Duval st.

Jacksonville, Fla.—Roadways within corporate limits of South Jacksonville connecting ferry with splendid county roads to beach and toward St. Augustine are to be properly paved.

Jacksonville, Fla.—Duval county bond issue of $1,000,000 for completion of paving of roads is being favorably discussed.

St. Augustine, Fla.—Bond election is being considered for road construction in St. John's county.

Tampa, Fla.—City Council has ordered paving of Howard ave., from Gray st. south to Bayshore boulevard with vitrified brick. County will bear one-half expense, as center of Howard ave. is western boundary line of city.

Rome, Ga.—Macadamizing of Avenue B has been authorized.

Washington, Ga.—At recent meeting of city council of Washington it was decided to utilize at early date $30,000 bond issue which was authorized last summer for paving purposes. This sum, with equal amount to be derived from property owners on Main st., where first paving will be done, will give city $60,000 with which to commence first grading and paving of streets and sidewalks. The H. S. Jourdan Engineering Company, of Savannah, has been chosen as consulting engineers for work.

Lexington, Ky.—Ordinances have been passed as follows: Directing Mayor to issue and sell Bryan ave., Main st. to Central ave, improvement bonds in sum of $1,599.88; East High st., Kentucky ave. to Ashland ave. improvement bonds in the sum of $8,018.07; South Upper st., from Bolivar to Limestone sts. improvement bonds in the sum of $1,424.86; Rose st. from Main st. to High st. improvement bonds in the sum of $2,288.11; East High st., Woodland ave. to Kentucky ave. improvement bonds in the sum of $1,857.60; Bolivar st. from Upper st. to Broadway street improvement bonds in the sum of $2,580.41; South Mill st. from Cedar to Bolivar st. improvement bonds in the sum of $2,814.79; East High st., Rose st. to Woodland ave. improvement bonds in the sum of $6,445.80.

Louisville, Ky.—Third st., from Main to Broadway, is to be reconstructed with asphalt, according to a decision reached by Board of Public Works. Bids on three classes of construction, asphalt, wooden block and vitrified brick were taken by Board and Henry Bickel Co. was lowest on all. Reconstruction of street with asphalt will cost $31,-176.35.

Louisville, Ky.—A decision of importance reached by Board of Public Works has to do with proposed improvement of Main st., from Fifth to Sixth st.

Baltimore, Md.—Improvement of various streets has been planned under paving commission.

Hyattsville, Md.—State Roads Commission, O. E. Weller, chairman, is preparing to construct 3½ miles of concrete road from T. B. in Nottingham district, to Charles County line, and about 5 miles of concrete road from District of Columbia line to Meadows, both highways in Prince Georges County.

Boston, Mass.—Plans are being made for improving of Harvard square.

Lawrence, Mass.—It is proposed to raise total amount to be spent in paving to sum of $140,000.

Marshall, Mich.—City will vote this spring on $50,000 bond issue for paving and surface sewer system.

St. Paul, Minn.—Highway from St. Pau lto Iowa line is being considered.

Poplar Bluff, Mo.—City has under survey some 40,000 sq. yds. of brick pavement, 4-in. gravel base, concrete, 1½-in. sand cushion, asphalt or cement grout filler; also orders for approximately 2 miles of additional pavement. Contracts will be awarded some time in March or April. Edward C. Thomas, City Engineer.

Bloomfield, N. J.—Ordinance has been passed by Bloomfield Town Council calling for issue of $196,000 30-year bonds for street improvements.

Camden, N. J.—Ordinances have been passed providing for improvement of various streets by paving, etc.

Jersey City, N. J.—Resolutions have been passed for improvement of various streets.

Jersey City, N. J.—Improvement of Cubberly st. has been authorized. E. B. See, clerk.

New Brunswick, N. J.—Paving of short-cut road from Stelton section to New Brunswick is under consideration.

Passaic, N. J.—Petition has been received for improvement of Hudson st., from Third st. to Fifth st. with macadam and asphalt binder.

Trenton, N. J.—Members of old Board of Freeholders have called on State Road Commissioner Stevens to discuss proposed State highway system that will traverse every county of State.

Brooklyn, N. Y.—Five local boards of the New Lots, Bay Ridge-Flatbush, Bay Ridge and Flatbush districts have approved of 88 resolutions for proposed improvements to streets.

Manhasset, L. I., N. Y.—Supervisor Philip J. Christ has announced that work will be started upon road improvements in Port Washington, Mannasset and Great Neck early this spring. At special election held in November, five propositions were carried to expend the sum of $109,500 to build macadam roads. Town Board has passed resolutions authorizing Board of Supervisors to give Supervisor Christ permission to issue bonds for work.

Roads to be improved are: Middle Neck road, from North Hempstead Turnpike to Reo Brook road, Great Neck; Station road and Tenth st., from Hicks road to Grace ave., Great Neck; Carlton ave., from Main st. to Reid ave., Second ave., from Carlton ave. to Main st., Third ave., from Carlton ave. to Main st., Fifth ave., from Carlton ave. to Main st., Port Washington; Susquehhanna ave. at Great Neck Station, from the Middle Neck road to the North Hempstead Turnpike; Bayview ave., from Plandome road to Shore road; Manhasset ave. and Highland terrace, from Plandome road to Bayview ave., Manhasset.

Schenectady, N. Y.—Ordinances have been passed directing improvement of various streets.

Syracuse, N. Y. — It is said that town of Clay will complete about 1,500 feet of stone road on Bear road, thus furnishing connecting link between towns of Clay and Salina.

Syracuse, N. Y.—Bill is being considered by Legislature appropriating $60,000 for substitution of brick paving for regular State road between Liverpool and Wolf st. in Syracuse.

Akron, O.—Ordinances have been passed for improvement of various streets.

Dayton, O.—Bond ordinance in sum of $40,900 will be submitted to Finance Committee for general repair of streets.

Dayton, O.—Ordinances have been passed authorizing sale of bonds for repair and improvement of 43 streets paved with asphalt in sum of $27,931, and 92 by graveling, at approximate cost of $12,956.25. Also to sell bonds to pay city's share of the cost for constructing sidewalks, curbing and graveling roadways and paving certain alleys, streets and avenues, in sum of $18,300. This improvement involves 37 streets and 12 alleys.

Dayton, O.—Resolution has been adopted instructing engineer to prepare plans for paving of Neal ave., from east line of Salem ave. to east line of Richmond ave.

Toledo, O.—Ordinance has been passed for improvement of Waite ave. No. 2.

Toledo, O.—City is planning to repave Cherry st., from Summit to Bancroft st.; St. Clair, from Monroe to Emerald ave.; Starr ave., Bancroft st. and Washington st.

Warren, O.—Bids will be received at the office of the City Audtior of the City of Warren, Ohio, until 12 o'clock noon, Tuesday, March 18th, 1913, for purchase of a series of Bonds, aggregating $14,500.00, issued for purpose of paying City's share of cost and expense of improving North Park ave. between certain limits by re-paving, etc. Wm. E. Dilley, City Auditor.

Portland, Ore.—Widening of Broadway is recommended.

Chester, Pa.—Street Committee of City Councils have taken up the development of city streets and have made plans for coming spring and summer. Several streets will be paved during year and committee i snow getting things into shape preparatory to advertising for bids on work.

Chester, Pa.—Repairing of West Third st., from Market st. to Concord ave. is being considered.

Hazleton, Pa.—Number of Councilmen and property owners have expressed preference for completion of Diamond ave. paving with amesite.

McKeesport, Pa. — Common Council has adopted number of resolutions, one of which instructs for repaving of Versailles ave., from Evans ave. to Grandview av.

Newberry, Pa.—Extension of West Fourth st. is recommended at estimated cost of $20,000.

Philadelphia, Pa.—Director Norris, of Dock Department, has opened bids for repaving Chestnut st. pier with wood blocks and making other improvements to pier. Three bids were received, as follows: Ernest Turtz, $16,696.90; A. Monday, $17,913.20, and W. S. P. Shields, $25,556.20.

Williamsport, Pa.—South Williamsport Council has decided to send petition to State Highway Department and to County Commissioners asking that Southern ave. be paved either with brick or with amesite macadam to be decided by members of Council at later meeting.

York, Pa.—The Stewartstown borough council has decided to have entire stretch of main highway rebuilt in the borough.

York, Pa.—Petitions have been signed for road to be rebuilt from Rineley to the Northern End of Stewartstown, 17,160 feet, and from Southern End of Stewartstown to farm of C. W. Shaw at Maryland line, 15,840 feet.

York, Pa.—County commissioners have made application to state highway department for reconstruction of public road leading from Maryland state line to Rineley, Hopewell township, distance of 38,000 feet, or 5.17 miles. Two of stretches, or 33,000 feet, one in Hopewell township and other, 5,000 feet, comprises length of Main st. in Stewartstown.

Camden, Tenn.—Court has voted for $200,000 bond issue to be used for road purposes.

Greeneville, Tenn.—The good roads association of county has secured passage of bill in Legislature providing for issuance by county of half-million dollars in bonds for road improvement. This is an addition to $300,000 in bonds heretofore issued. Question of issuing bonds is to be submitted to people at election to be called for this purpose.

Knoxville, Tenn.—Question of pike road from what is known as Fork County, in Sullivan County, to Johnson City, distance of 12 miles, is being discussed.

Corsicana, Tex.—The attorney general's office at Austin has approved Corsicana's $20,000 street paving bonds and they are now ready for the market.

Corpus Christi, Tex.—Mayor Pease has recommended terracing the bluff with paving funds.

Dallas, Tex.—Widening of East Main st. is being considered.

Dallas, Tex.—Property owners have filed with Municipal Commissioners what is said to be unanimous petition for permanent paving of Colonial ave., from Lenway to Casey st.

Columbus, Wis.—Bids for paving opened by Board of Public Works. Total amount, 8,625 sq. yds. pavement; 5,080 ft. curb and gutter, and 1,850 yds. excavation. (A) J. Rashsmussen & Sons, Oshkosh; (B) Thos. E. Wooley, La Crosse; (C) Ed. L. Bartlett, Watertown; (D) Nelson-Weber Const. Co., Oconomowoc. W. A. Peirce, City Engineer:

	(A)	(B)	(C)	(D)
Excavation	$0.40	$0.35	$0.40	$0.39
Curb	.45	.35	.47	.40
Curb and gutter	.57	.50	.58	.53
Barr brick	2.04	2.09	2.10	2.01
Danville brick	...	2.07	...	...
Purington brick	2.06	2.07	2.11	2.03
Asphalt concrete:				
Bermudez penetration	1.50	...	1.55	1.47
Misc. penetration	...	1.66	...	...
Bermudez mixed	1.65	...	1.70	1.63
Misc. mixed	...	1.66	...	...
Concrete	...	...	1.50	...
			1.55*	

*Denotes concrete, one coat process. The miscellaneous asphalt bid is for any asphalt conforming to specifications. Above bids taken on a one-year guarantee bond. Prices for concrete curb and gutter are per lineal foot, other prices are per square yard of pavement and cubic yard of excavation.

Chester, Pa.—Ordinance has been passed authorizing the grading of Upland st., from Fourteenth st to Fifteenth st.; also Diamond st. C. B. Mould, City Clerk.

Fort Worth, Tex.—County Commissioners' Court of Tarrant County have made appropriation of $10,000 to be used as county's proportion of expense of building government road from this city to Mineral Wells via Weatherford.

Fort Worth, Tex.—Survey of West Cleburne road by Engineers Hudgins and Hays has been completed. This road is generally known as South Cardinal road of Tarrant County.

Houston, Tex.—Harris County voters by overwhelming majority have decided to issue bonds in sum of $1,000,000 for improvement of roads and bridges of county.

San Antonio, Tex.—Petition has been received asking for widening and extension of **East Houston st.**

Salt Lake City, Utah.—Bill to appropriate $50,000 to aid in building of proposed automobile highway from Utah-Colorado line to Salt Lake City over route known as Midland Trail, has been passed by the House.

Meherrin, Va.—In Plymouth district, where special election has been held on question of issuing $30,000 for good roads, bonds were authorized by vote of 46 for to 10 against.

Norfolk, Va.—Construction of highway from Norfolk to Cape Henry and Virginia Beach is being discussed.

Petersburg, Va.—Special council committee appointed to report plan for improvement of River st. has decided to recommend raising of grade of streets.

Richmond, Va.—Bids have been invited for granolithic curbing for west side of Sycamore st., between Main st. and Floyd ave.

Richmond, Va.—Revised plans for widening Cary st. by cutting off strip of the sidewalk having been filed by City Engineer Bolling, Administrative Board directed that bids be invited, returnable March 14, for grading, granite curb and small paving of roadbed of Cary st. from Allen ave. to Boulevard, the preliminary estimate of which is about $30,000.

Moundsville, W. Va.—Marshall county court is advertising for sale of bonds for road improvements to be made in very near future in Union district roads. Sealed bids will be opened on March 25th, at office of the clerk of county court at 2 o'clock.

Olympia, Wash.—Bill for appropriation of $500,000 for this State's share of cost of proposed Pacific highway will be placed before Legislature.

Seattle, Wash.—Ordinance has been introduced directing Board of Public Works to pave portion of Fifteenth ave. West and Thorndyke ave., with asphalt, and appropriating money therefor; also ordinance authorizing Board of Public Works to pave portion of Westlake ave. North with asphalt.

Seattle, Wash.—Plans have been approved for paving of Plum st.; estimated cost, $36,450; grading of McClintock st., estimated cost $3,880; paving of Grand ave., estimated cost $61,645, and for concrete walks on North and West Seventy-ninth st., estimated cost $5,050.

Tacoma, Wash.—County Commissioners will hold special election for purpose of voting bonds in sum of $500,000 to build hard surface roads in Pierce County.

Tacoma, Wash.—Improvement of part of Mount Tacoma road is being planned.

Vancouver, Wash.—County Surveyor W. A. Schwarz has completed preliminary survey for proposed improvement of Main st. road for distance of approximately 3 miles beyond city limits, and estimated cost is $32,000. Under permanent highway act, it is proposed to pave this strip of road with hard surface, State to bear 85 per cent. of cost, or $28,000, and property owners along road balance.

Jonesville, Wis. — Improvements of seven different streets and avenues by laying of cement curbs and gutters has been voted by city council. Sections of street to be improved are Racine st. from Main st. to easterly end of Racine st. bridge; Galena st. from westerly end of Racine st. bridge to River st.; Glen st., from Milton ave. to Garfield ave.; Prospect ave., from Milton ave. to Garfield ave.; Forest Park Blvd., from Ruger ave. to Oakland ave.; Locust st. from Pleasant st. to Western ave.; and Academy st. from Pleasant to Galena st.

Milwaukee, Wis.—City will undertake extensive grading improvements in April.

CONTRACTS AWARDED.

Imperial, Cal.—To H. H. Peterson, of Imperial, contract for constructing 14 miles of cement sidewalks, curbs and crosswalks, at 16.3 cts. per sq. ft. for sidewalks, 23 cts. per sq. ft. for crosswalks, and 29.2 cts. per lin. ft. for curbs.

Los Angeles, Cal.—Board of Public Works has authorized signing of contract with George Oswald for paving of Main st., from Thirty-sixth place to Manchester ave. Stretch of road will be connecting link between city and harbor boulevard to San Pedro and Wilmington.

Oakland, Cal.—By City Council, contracts as follows for street paving: Grove st., from Fortieth st. to the city line, to the Barber Asphalt Paving Co., for $74,465; Broadway, from Thirty-fourth st. to College ave., to the Oakland Paving Co., for $72,600; Telegraph ave., from Fortieth to Fifty-second sts., to Ransome-Crummey Co., for $38,875.

San Diego, Cal.—Contracts for street improvements have been let as follows: Grading Texas st. and El Cajon ave., King Construction Co., $16,255.11 and $35,275.04, respectively; improving G st., from Seventh to 16th st., Ford & Stout, $21,734.32.

Atlanta, Ga.—By Public Works County Board, contract to Samuel E. Finley for oiling of 30 miles of macadam and asphalt roads in the county. Roads are to be treated with liquid petroleum asphalt for 6½ cts. per sq. yd. for the first treatment, and 3½ cts. per sq. yd. for subsequent treatments.

Waycross, Ga.—To Lewis & Stafford, Augusta, Ga., contract by Board of Aldermen for laying 6,000 sq. yds. of asphalt blocks on Albany ave., and for constructing 4,500 ft. of curbing for $3,790.

Crawfordsville, Ind.—By County Commissioners, for paving as follows: Crawfordsville—Smith gravel road in Franklin Township, to O'Connor Bros., at $5,-202; Frank Graves road, in Union Township, to O'Connor Bros., at $6,792; Reeves road, in Brown Township, to N. F. Scribner, at $5,500, Miles stone road, in Brown Township, to Snyder A. Barnett, at $10,874, and Gray stone binder road, in Union Township, to J. A. Harden, at $19,337; also other cities as follows: Vincennes—Downey gravel road, to J. C. Rodgers, at $7,997, and Fox gravel road, to George Morgan, at $5,-137. Versailles—Pike gravel road, in Ripley Township, to Charles W. Baylor, of Batesville, at $7,623. Wabash—The Engleman road, to Schaeffer & Browning, at $16,800.

Richmond, Ind.—For improvements to South Sixth and South Second sts., to Schneider Bros., and construction of cement alley between North Thirteenth and Fourteenth sts., from A to B sts., has been awarded to D. G. Burkhardt. South Sixth and South Second sts. will be improved by construction of cement sidewalks, curb and gutters along Sixth from South A to South E sts., and South Second from South A to B sts.

Rockport, Ind.—By County Commissioner contract for construction of rock road in Troy Township to Frank Paulin Co., at $64,602.

Belle Plaine, Ia.—Low bidders for paving work at Belle Plaine, Iowa, Feb. 24, 1913, were as follows: Brick with sand filler, Des Moines Asphalt Paving Co., Des Moines, Iowa, $57,895.58; brick with asphaltic filler, Des Moines Asphalt Paving Co., $61,748.96; asphaltic concrete, Des Moines Asphalt Paving Co., $54,404.20; asphaltic macadam, Des Moines Asphalt Paving Co., $52,-595.59; concrete, Ward & Weighton, Sioux City, Iowa, $41,779.98; dolarway, Ford Paving Co., Cedar Rapids, Iowa, $48.727.88. Iowa Engineering Company, Engrs., Clinton, Iowa.

Sioux City, Ia.—To Studebaker Corporation, Chicago, Ill., contract for furnishing one street flushing machine.

Minneapolis, Minn.—To Republic Creosoting Company, 2300 Marshall ave., S. E., contract for paving of 175,000 sq. yds. with creosoted blocks at $1.40 for 3 1-2 in. and $1.60 per sq. yd. for 4 in.

St. Paul, Minn.—To D. W. Moore, contract at $2,769 for grading of Almond st., from Hamline ave. to Snelling ave.

St. Paul, Minn.—Following contracts for county road improvements have been let: Washington County line road, M. S. Mergens, $2,990; Barlow road, J. Corr, $5,482; Lake Jahanna road, J. Corr, $5,604; White Bear and Lake Phalen road, D. Arcand, $8,100; North St. Paul and Washington County line road, Thornton Bros., $7,787.

Atlantic City, N. J.—By commissioner to Chas. H. Cramer for paving of twenty-seven streets and alley with Mack Repressed Vitrified Block at $2.35 per sq. yd. on 6 in. concrete foundation.

Buffalo, N. Y.—By Common Council to German Rock Asphalt & Cement Co., contract for repaving Amherst st., from Military road to Elmwood ave., 40 ft. wide, with asphalt, at $47,930.

Newfane, N. Y.—To Erie Construction Co., of Buffalo, for construction of State road from Lockport to Olcott. Roadway is to be 16 ft. wide, with 6-in. concrete base and bituminous asphalt covering.

Pawling, N. Y.—To Michl R. Spino, of Fishkill Landing, N. Y., contract for construction of new roadway at Quaker Hill for $13,775.

Chardon, O.—To George B. Herring & Son, of Cleveland, O., contract for paving North st., in Chardon, O., for $16,-119. Brick will be used.

Cleveland, O.—To Cleveland Trinidad Paving Co. contract at $14,260.32, for repaving with creosoted wood block Eagle ave., S. E. from E. Fourth to E. Ninth st.

Fremont, O.—By Board of Public Service, contracts for street improvements, as follows: 7,000 sq. yds. brick paving in Bucklin st., Zeigler & Reardon, 1117 Garrison st.; 12,000 sq. yds. brick paving in Rawson ave., Modern Construction Co., 105 Justice st. W. F. Schepflin is city engr.

New Concord, O.—By Village Council, contract to Houston & Henderson, Logan, O., at $30,000, for 16,544 sq. yds. brick paving.

Orrville, O.—To Lee & Gregg, of Millersburg, contract for paving of Main st., with Wooster block on concrete foundation at $9,532.

Youngstown, O.—By Board of Control contract for paving of Marion ave. with asphalt, to Cleveland Trinidad Asphalt Paving Company, of Cleveland.

Portland, Ore.—To Carter Bros., at $36,559, contract for grading of Saratoga ave.

Greenville, Pa.—Contract for paving of Clarksville, North High, North and South Mercer and North and South Main sts. has been let by Borough Council to Roess & Lesure of Oil City for $72,143. Brick block, asphalt block and brick will be used.

Dallas, Tex.—By Board of Municipal Commissioners, contracts for paving of streets as follows: Worth and Victor sts., with asphaltic macadam to J. A. Gregory, 1418 Praetorian Building, at $1.35 per sq. yd. and Rieger and Crutcher sts., with bitulithic at $2.35 per sq. yd., to Texas Bitulithic Company, Praetorian Building. The improvement to cost about $35,000.

Greenville, Tex.—By city, for paving, and contracts have been awarded as follows: To F. P. Dellone & Co., Independence, 95,000 sq. yds. vitrified brick, 4-in. concrete base, $1.70; 60,000 lin. ft. concrete curb, 38 cts., and extra excav., 32 cts. per cu. yd., and to Levy & Levy, Muskogee, Okla., asphaltic concrete on concrete base, $1.59 sq. yd.; 30,000 lin. ft. combination curb and gutter, 60 cts.; extra excav., 28 cts. per cu. yd., and 3-in. creosoted wood block, $2.48 sq. yd.

Portsmouth, Va.—Local board has recommended that contract for improvement of High st. be awarded to the McGuire Construction Co. at following bid: Grading lump sum $6,000; 5 in. granite curbing, 5,728, and bituminous paving on 5 in. concrete base with 2 in. surfacing, $44,104; total, $55,832.

Seattle, Wash.—By Board of Public works, for paving of Fremont ave., to Barber Asphalt Paving Co., also paving of North Fiftieth st., to P. J. McHugh, at $156,128.41.

SEWERAGE

Clayton, Del.—Bill has been passed authorizing Clayton to borrow $15,000 for sewerage and water systems.

Newark, Del.—Bill has been passed authorizing Newark to vote on loan of $60,000 for sewers, etc.

Tampa, Fla.—Bids have been opened for storm sewer proposed for western section of city, south of Grand Central ave. They ranged from $48,000 to $77,-000. Contract was not let.

South Bend., Ind.—That proposed Bowman Creek trunk sewer will cost $150,-000 is opinion of City Engineer W. S. Moore, who has filed estimate with Board of Public Works. This is first official estimate placed on this improvement. Mr. Moore also estimated cost of Mishawaka ave. trunk sewer at $40,000.

Davenport, Ia.—Board of Public Works has completed designs and estimates for construction of sanitary sewer system in 13th sewer district.

Sioux City, Ia.—City Council has adopted plans for storm sewers to be built the coming summer, which will cost about $20,000.

Dodge City, Kan.—City Commission have decided to install 2 miles of sewer mains, to cost about $7,000.

Danville, Ky.—Bids will be received until 2 p. m. March 15, at Water Office, by J. M. Wallace, Mayor, for $18,000 worth of sewer bonds.

Madisonville, Ky.—Plans and specifications are being prepared for sewerage and water systems, and contracts will be let April 2, for cast-iron water mains, construction of steel tank, laying of water mains. W. J. Dutin, Secretary of Board of Public Works.

Princess Anne, Md.—Construction of sewers has been authorized to cost $8,000.

Marshall, Mich.—City will vote this spring on $50,000 bond issue for surface sewer system and paving.

Johnstown, N. Y.—Bids for $62,000 sewer bond issue have been opened. Successful bidder was Isaac W. Sherrill, of Poughkeepsie, N. Y., whose bid was $105.39. Bond issue is for sewer improvements that were completed during past year.

Oswego, N. Y.—Bids on construction of proposed storm water sewer in Harbor brook on East Side and for construction of other sewers costing $200,000, will be advertised for shortly.

Port Chester, N. Y.—Plans are being considered for construction of sewage disposal plant.

Langdon, N. D.—Establishment of sewerage system is being considered.

Akron, O.—Ordinances have been passed for construction of various sewers.

Canton, O.—Mr. R. Winthrop Pratt, of Cleveland, O., has been retained by Director of Public Service to make a report and general plans for sewage purification plant for this city.

Dayton, O.—Resolution has been adopted instructing engineer to proceed with construction of storm sewers on Forest ave., from Grand to Kenwood, $190; Miami Chapel road, from Cincinnati to the Big Four Railway, $2,000; Glendale ave., from Cambridge to Oxford, $2,200; Laura, between Newport and Theodore ave., $800; Hussong lane, from DeKalb to Monument, $60; Lakeview, at Clifton drive, $147.

Dayton, O.—Bond ordinance in sum of $72,000 will be submitted to Finance Committee for construction of storm water sewers.

Dayton, O.—Ordinance has been adopted to sell bonds in sum of $72,000 to provide money with which to pay for construction of storm sewers on 23 streets, including Bowen, Blaine, Davis, Grand, Greenwood, Burkhardt, Cincinnati, Findlay, Herman, Lakeview, Negley place, Rubicon, St. Joseph, Springfield, Superior, Waldo, Wildwood and Wilford.

Warren, O.—Bids will be received at the office of the City Auditor of the City of Warren, until 12 o'clock noon, March 18th, 1913, for the purchase of Bonds in sum of $2,550, issued for the purpose of paying the cost and expense of constructing a storm sewer in and along Belmont st., and through certain private right of ways. Wm. E. Dilley, City Auditor.

Scranton, Pa.—Council has received from Director of Public Works C. V. Terwilliger statement of estimated cost of completing sewer system of entire city, including two big relief sewers, Linden st. and Poplar st. Sewer systems alone will require upwards of $250,000, which, in addition to $120,000 needed for Department of Public Safety, will run total of cost to $370,000 for these departments alone. Sewers will include systems in Twenty-first and Twenty-second Wards, in the Twelfth, Nineteenth and Twentieth Wards, and in First, Second and Third Wards, and on Albright ave.

Sharon, Pa.—City Solicitor Davis has received approval of plans and proposed site for sewage disposal plant for Sharon.

Howard, S. D.—City Council is taking steps to provide Howard with sewer system.

Knoxville, Tenn.—City of Knoxville will spend $125,000 in building of main sewer and laterals in that section of West Knoxville lying west of Ninth st. and between main line of Southern railway and Tennessee river.

Dallas, Tex.—City Secretary has been instructed to advertise for bids for laying of 6-in. sanitary sewer in Pembroke and Brooklyn, west from Zang boulevard. There will be 290 ft. of pipe.

North Yakima, Wash.—Special election will be held March 18 for purpose of voting on bond issue of $260,000 for sewer system. New sewer system with a $50,000 disposal plant is recommended.

Seattle, Wash.—Plans have been approved for sewers on Dexter ave. to cost $36,000.

Dauphin, Man.—Council has ordered that by-laws be prepared for issue of $152,000 bonds for completion of sewerage, waterworks and general improvements. W. G. Langdon, Publicity Commissioner.

CONTRACTS AWARDED.

Alhambra, Cal.—By city, contract to Andrew Holloway, of Pasadena, for construction of sewer system at $16,085.

Oroville, Cal.—To J. W. Terrell, of Chico, Cal., contract for construction of storm water sewer system, for $20,907. Other bidders were: Chambers & Healey, $22,793; O. H. Siebel, $27,817, and W. C. Hunter, $28,202.

San Francisco, Cal.—By directors of the Panama-Pacific Exposition Co., contract to Michael Murphy for construction of sanitary and storm sewers in State and foreign sites at $28,350.

Moline, Ill.—By Board Local Improvement for constructing sewers in Twenty-fifth Sewer District, requiring 8,455 ft. 12, 10 and 8-in. vitr. pipe sewer, Y's, manholes, etc., to Moline Htg. & Contr. Co., of Moline, at $7,246. Lyle Payton is city engineer.

Richmond, Ind.—By Board of Public Works of Richmond, contract for construction of Reeveston sewer system, to F. E. Slick, for $21,523. Work calls for trunk sewer and lateral branches drainage almost 40 acres of ground.

Cedar Rapids, Ia.—For storm sewer in southeastern section of city to R. C. De la Hunt at $23,465.

Tipton, Ia.—Bids have been received for construction of sewer work as follows: (a) 3,420 ft. 15 ins. vit. pipe; (b) 4,500 ft. 12 ins. vit. pipe; (c) 10,550 ft. 10 ins. vit. pipe; (d) 34,500 ft, 8 ins. vit. pipe; (e) 48 ft. 12 ins. C. I. pipe; (f) 132 ft. 10 ins. C. I. pipe; (g) 48 ft. 8 ins. C. I. pipe; (h) 85 manholes; (i) 53 flushtanks. Contract has been awarded to J. W. Turner, Impr. Co., Des Moines, Ia. Bids as follows: J. W. Turner, Impr. Co. awarded, Des Moines, Ia., (a) $3.60, (b) $3.40, (c) $1.30, (d) 60c, (e) $4.00, (f) $3.00, (g) $2.00, (h) $40.00, (i) $64.75, total $69,542.75; Independent Constr. Co., Davenport, Ia., (a) $4.00, (b) $4.00, (c) $1.25, (d) 80c, (e) $4.00, (f) $3.75, (g) $2.50, (h) $40.00, (i) $65.00, total $80,119.50; Lytle Constr. Co., Sioux City, Ia., (a) $3.99, (b) $3.99, (c) $1.22, (d) 73c, (e) $5.00, (f) $4.00, (g) $3.00, (h) $40.00, (i) $65.00, total $74,713.80; Lana Constr. Co., Council Bluffs, Ia., (a) $2.50, (b) $2.50, (c) $2.50, (d) 75c, (e) $4.00, (f) $3.00, (g) $2.00, (h) $35.00, (i) $60.00, total $78,889.00; Fraser & Danforth, St. Paul, Minn., (a) $3.25, (b) $2.80, (c) $1.80, (d) 75c, (e) $3.00, (f) $2.00, (g) $1.50, (h) $50,00, (i) $90.00, total $78,080.00; E. T. Webster, St. Paul, Minn., (a) $3.71, (b) 2.72, (c) $1.36, (d) 97c, (e) $3.35, (f) $2.88, (g) $2.10, (h) $55.00, (i) $100,000, total $83,357.96; J. O. Sever.ns, Oklahoma City, (a) $2.75, (b) $2.25, (c) $1.70, (d) $1.15, (e) $5.00, (f) $4.00, (g) $2.00, (h) $60.00, (i) $90.00, total $87,874.00. Charles P. Chase, Consulting Engineer, Clinton, Ia.

Sioux City, Ia.—To Lytle Constr. Co., of Sioux City, contract for constructing sewers on E. 7th, W. 3d and 4th and 19th and 20th sts., at about $21,939.

Boston, Mass.—By Commissioner of Public Works, contract for underground sewage pumping station in Summer st., South Boston, to Anthony Barnffaldo, 5 Parker pl., Somerville, at $5,465.

Fairmont, Minn.—By Commissioners of Martin county, contract to Schaefer Bros., Imogen, Minn., at $2,050, for digging and constructing ditch No. 32.

Dillon, Mont.—By City Council, contract for construction of sewers in District 5 and A, to Lindstrom & Oren, of Butte, Mont., for $11.798. They also secured contract to construct sewers in District No. 6, for $3,832.

Fairview, N. J.—By Borough Council for construction of system of sewers and sewage disposal plant for the entire town to John I. McGarry of Edgewater, $112,451. Other bids as follows: Aug. Thiel, Guttenberg, N. J., $123,000; Edward P. O'Neil, Jersey City, $120,944; Jos. Murphy & Son, West Hoboken, $117,137; Horning & Brunner, West New York, $117,118.

Dallas, Tex.—To Dallas Lime & Gravel Co., contract for laying 6-in. sanitary sewer in district between Grand, Exposition, Brady and the Peak Branch. The price is $2.547.16.

Everett, Wash.—To Jahn Contracting Co., of Seattle, contract to lay 16 miles of sewer pipe, on their bid of $162,500.

WATER SUPPLY

Birmingham, Ala.—Citizens in Highland Park are asking for filtered water from city plant.

Sulphur Springs, Ark.—Bids are being received for construction of complete water works and lighting plant. A. C. Moore, Engr., Joplin, Mo.

Orland, Cal.—Negotiations are under way by Trustees for securing water for irrigation purposes within incorporated limits of town from Orland government irrigation project.

Richmond, Cal.—Bonds have been voted for construction of municipal water system.

Sacramento, Cal.—Two distinct propositions in matter of proposed mountain water supply for City of Sacramento have been submitted by T. G. Patton, of Placerville, and O. Scribner, of San Francisco, to sub-committe appointed by General Committee organized by Chamber of Commerce for purpose of investigating possible sources of water supply.

San Francisco, Cal.—The Finance Committee has granted $2,298 for pump, pipe and storage tank, which are required to supply water to new Fire Department engine-house on Nineteenth ave., near Rivera st.

Clayton, Del.—Bill has been passed authorizing Clayton to borrow $15,000 for water and sewerage.

Jacksonville, Fla.—Bids will be received by the Trustees until 3 p. m., March 4, for purchase of water works and improvement bonds. W. M. Bostwiek, Jr.

Evanston, Ill.—It is expected that plans and specifications for a 12,000,000 gallon mechanical filter plant with appurtenances will be completed so that bids will be received by Commissioner of Public Works J. H. Moore during first week in April, and that copies of plans, etc. may be obtained by contractors on or before March 15 from the engineers, George W. Fuller, 170 Broadway, New York City, and Longdon Peake, 76 W. Monroe st., Chicago, Ill.

Dubuque, Ia.—Plans are being prepared for reservoir of 4,000,000 gallons capacity. Estimated cost $665,000.

Fontanelle, Ia.—Petition is being circulated asking for special election for purpose of voting on construction of water works system.

Lake City, Ia.—Special election will be held March 6 for purpose of submitting bond issue amounting to $12,000 for purpose of improving water works system.

Madisonville, Ky.—Plans and specifications are being prepared for water and sewerage systems, and contracts will be let April 2, for cast-iron water mains, construction of steel tank, laying of water mains and laying of sewers. W. J. Dulin, Secretary of Board of Public Works.

Thibodaux, La.—Board of Aldermen, discussing water system from flat rates to meter rates and installation of meters, have decided to advertise for meters, reserving right to reject any and all bids. Idea is to make rate for water 10 cts. per 1,000 gallons.

Fertile, Minn.—City Council is discussing electric lighting of city streets.

Redwood Falls, Minn.—Water works proposition for bond issue of $13,000 has been carried at special election.

Fairfax, Mo.—Water works system will probably be installed.

Roundup, Mont.—Municipal ownership of water works system is under consideration.

Whitehall, Mont.—At election in April bond issue of $7,000 will be submitted for water works system.

Silver Creek, Neb.—Special election will be held March 11 for purpose of voting on $8,000 bond issue for installing water works system.

Trenton, N. J.—Gov. Wilson has approved million-dollar bond issue by Water Supply Commission to pay for 110,000 acres of land in Burlington and Atlantic Counties, to be purchased for water shed to provide water supply for South Jersey. Bonds are to be taken by estate of Joseph Wharton, from whom land is to be purchased.

Port Washington, L. I., N. Y.—Movement has been started to establish municipal water plant here.

Schenectady, N. Y.—Clerk Pifer has been authorized to advertise for bids for stop valves for Water Bureau.

Dayton, O.—Proposals for furnishing meters for Water Works Department have been opened at office of Service Director Hogien. Contract involves approximately $18,000. Bids differ materially in connection with various sizes, Buffalo Meter Co., the Badger Meter Co. and M. R. Worthington being among lowest. Contract is based upon 2,000 ⅝-in. meters, 100 ¾-in. meters, 25 1-in. meters, 10 1½-in. meters, 10 2-in. meters, 10 3-in. meters, 20 4-in. meters and 3 6-in. meters. Bids submitted will not be tabulated and reviewed for a few days, and the contract will not be awarded before latter part of week. They were as follows: Union Meter Co., Worcester, Mass—3-in. meter, with connection, $58; 4-in. meter, $115; 5-in. meter, $260. Pittsburgh Meter Co.—With connection, 3-in. meter, $85; 4-in. meter, $175; 5-in. meter, $375; ⅝-in., $8.40; ¾-in., $12.60; 1-in., $16.80; without connections, ⅝-in., $8; ¾-in., $12; 1-in., $16; 1½-in., $30; 2-in., $50. Neptune Meter Co., New York—With connections, ⅝-in., $8.40; ¾-in., $12.60; 1-in., $16.80; 3-in., $80; 4-in., $160; 6-in., $350; without connections, ⅝-in., $8; ¾-in., $12; 1-in., $16; 1½-in., $30; 2-in., $50. Buffalo Meter Co., Buffalo, N. Y.—With connections, ⅝-in. meter, $5.40; ¾-in., $8.20; 1-in., $11; without connections, ⅝-in., $5.14; ¾-in., $7.80; 1-in., $10.50; 1½-in. $20; 2-in., $25. Thomson Meter Co., Brooklyn, N. Y.—Without connections, ⅝-in., $7.56; ¾-in., $11.34; 1-in., $15.12; 3-in., $76.50; 4-in., $157.50; 6-in., $337.50; without connections, ⅝-in., $7.20; ¾-in., $10.80; 1-in., $14.40; 1½-in., $27; 2-in., $45. National Meter Co., Cincinnati—With connections, ⅝-in., $10.40; ¾-in., $15.60; 1-in., $23.50; 1½-in., $40; 2-in., $60; 3-in., $125, $80 and $100, according to type; 4-in., $225, $160 and $2,200, according to type; 6-in., $400, $300 and $350, according to type. Hersey Mfg. Co., Boston—With connections, 3-in., $85; 4-in., $175; 5-in., $350 and $375, according to type. Badger Meter Co., Milwaukee, Wis.—With connections, ⅝-in., $5.73; ¾-in., $8.40; 1-in., $11.10; 3-in., $70; 4-in., $127; without connections, ⅝-in., $5.48; ¾-in., $8.10; 1-in., $10.60; 1½-in., $23; 2-in., $32.50. H. R. Worthington, New York—With connections, ⅝-in., $5.35; ¾-in., $8.25; 1-in., $11; disc meter, 3-in., $70; 4-in., $125; 6-in., $2,520; turbine meter, 3-in., $59; 4-in., $104; 6-in., $210; without connections, ⅝-in., $5.10; ¾-in., $7.90; 1-in., $10.55; 1½-in., $21; 2-in., $35.

Dayton, O.—Bond ordinances will be submitted by finance committee to city council for proposed improvements entailing expenditures of $177,800. These will be designed to take care of public improvements of all character during the year 1913. Among these ordinances will be one in sum of $45,000 for purpose of furthering work on water works improvements and extensions.

Fostoria, O.—Mr. R. Winthrop Pratt, of Cleveland, O., has been retained to assist Mr. Charles S. Latshaw, City Engineer, to prepare plans for enlarging and remodelling purification works.

Pleasant, O.—Bond issue of $15,000 has been sold for installation of water works system.

Steubenville, O.—Plans are being prepared by Chester & Fleming, engineers, of Pittsburgh, for new filtration plant.

Eugene, Ore.—A safer source of water supply and better and more extensive distributing system are aims of Eugene Water Board, if people will approve at April 7 election issue of $100,000 of bonds for benefit of department.

Oregon City, Ore.—Council committee has decided to employ engineer to make investigation of water conditions here and report to committee as soon as possible.

Farrell, Pa.—Special meeting of Farrell Council has been held and ordinance for holding special bond election for purpose of learning whether people desire that $125,000 in bonds be issued and municipal water plant erected, has been given three readings and date of election set for April 8.

McKeesport, Pa.—Resolution instructing controller to advertise for new boilers at water works has been adopted.

New Castle, Pa.—Mr. R. Winthrop Pratt, of Cleveland, O., has been retained to make report upon means for protecting city from damage by floods. Mr. C. H. Milholland is City Engineer.

McIntosh, S. D.—Bond issue of $12,000 has been voted for installation of better water system.

Nashville, Tenn.—Bond issue of $2,000,000 will be voted on May 29 for construction of city reservoir.

Fort Worth, Tex.—Proposed issuance of $300,000 bonds for completion of new water works is under consideration.

Portsmouth, Va. — Installation of municipal water works system is planned.

Portsmouth, Va.—Specifications and maps are now being prepared preparatory to advertising for construction of filtration plant, pumping stations, stand pipe and piping of city. Proposals to do this work will be advertised for during July or August, and it is hoped to have entire plant completed by 1st of January, 1914. Bonds, amounting to $600,000, will probably be disposed of during July or August.

Seattle, Wash.—Plans have been approved for construction of water mains to cost $2,200.

Boscobel, Wis.—Bonds have been voted for proposed municipal water works plants.

Dauphin, Man.—Council has ordered that by-laws be prepared for issue of $152,000 bonds for completion of water works, sewerage and general improvements.

CONTRACTS AWARDED.

Gravette, Ark.—By City, to A. J. Foster of Joplin, Mo., to construct water works and electric light plant costing about $25,000.

Hartford, Conn.—By Board of Water Commissioners, for furnishing 1,508 tons c.-i. pipe, 6 to 24-in. in diameter, and 108 tons special castings, to Standard Cast Iron Pipe & Fdy. Co., Bristol, Pa., at $23.95 per ton for pipe and $47 per ton for castings; total, $41,193. Totals of other bids: U. S. Cast Iron Pipe & Fdy. Co., Philadelphia, Pa., $42,119; R. D. Wood & Co., Philadelphia, Pa., $42,149; Warren Fdy. & Machine Co., New York City, $43,703; Charles Millar & Sons Co., Boston, Mass., $46,656. Caleb Mills, Saville, is Chief Engineer.

Greeley, Col.—To Fraser & McCabe, of Boulder, Col., for furnishing of materials for and construction of Distribution Reservoir No. 2 of water works of city. Bid was $11,210. Other bidders were: Sherman Construction Co., Greeley, $12,235; John S. Morrison, Greeley, $12,866. The work includes 1,560 cu. yds. of concrete lining for wells, etc., for reservoir, to be 232 ft. by 256 ft. by 14 ft.

Greeley, Colo.—By City Council, for construction of distribution reservoir No. 2 of water works to Fraser & McCabe, Boulder, Colo., at $11,209.80.

Zolfo, Fla.—Town has closed contract with Cameron & Brackley Company of Tampa, for complete water works system, which is to be complete and ready for service by April 5th. Water is to be supplied from artesian well which is located in center of town, this water being of highly mineralized nature and has proven to be very healthful.

Waycross, Ga.—To R. D. Cole Mfg. Co., Newman, Ga., contract by Board of Aldermen, Waycross, Ga., for one boiler of horizontal return tubular type without dome, for $1,653.

Moline, Ill.—By Board Local Improvement for constructing water mains in Twenty-fifth st. watermain district, requiring 10,235 ft. 8 and 6-in. c.i. pipe, T's, bends, etc., to Moline Htg. & Contr. Co., of Moline, at $12,319. Lyle Payton is city engineer.

Glen Elder, Kan.—To Des Moines Bridge & Iron Works, Des Moines, Ia., contract, at $15,000, for construction of water works for Glen Elder.

Baltimore, Md.—Bids for sluice gates and appurtenances for new Loch Raven dam have been opened by Board of Awards as follows: (a) 4 48-in. by 72-in., (b) 2 48-in. diameter, (c) 4 24-in. diameter, (d) 260 lin. ft. 3½-in. gate stems with couplings, (e) 170 lin. ft. 24-in. gate stems with couplings, (f) 24 guides for 3½-in. stems, (g) 8 guides for 2½-in. stems. Coffin Valve Co., Boston, Mass., (a) $538 each, (b) $500 each, (c) $164 each, (d) $1.60 per ft., (e) 70c. per ft., (f) $12.70 each, (g) $8 each; (own specifications), (a) $447 each, (b) $427 each, (c) $151 each, (d, e, f and g), $905.20. Chapman Valve Mfg. Co., Indian Orchard, Mass., (a) $560 each, (b) $485 each, (c) $146 each, (d) $1.40 per ft., (e) 50c. per ft., (f) $8 each, (g) $5 each; Coldwell-Wilcox Co., Newburgh, N. Y., (a) $599 each, (b) $401 each, (c) $219 each, (d) $1.45 per ft., (e) 73c. per ft., (f) $10.50 each, (g) $7.50 each. Flynn & Emrich Co., Baltimore, Md., (a) $785 each, (b) $700 each, (c) $375 each, (d) $1.30 per ft., (e) 60c. per ft., (f) $26 each, (g) $24,50 each; W. W. Lindsay & Co., Philadelphia, Pa., agents for Ludlow Valve Co., (a) $907 each, (b) $738.50 each (c) $256 each, (d) $1.60 per ft., (e) 75c. per ft., (f) $17.25 each, (g) $14 each. Contract has been awarded to the Coffin Valve Co., of Boston.

Ramsey, N. Y.—By borough council contract to H. S. Heeney, White Plains, N. Y., for reservoir for water works.

Gettysburg, Pa.—For water system contracts have been awarded as follows: Water system, to L. B. Jacobs, Newark, Del., at $15,500; Latrines and pits, kitchen frames and pits, to Rezin W. Darby, Washington, D. C., at $19,707.

Decatur, Ill.—Bids received for filter plant. Contract was awarded to New York Continental Jewell Filtration Co., of New York City. (A) H. C. Gass, Belleville, Ill.; (B) Beers-Offut Construction Co. Ft. Wayne, Ind.; (C) Hofer & Co., Chicago, Il.; (D) New York Cont. Jewell Filt. Co. New York, N. Y.; (E) Norwood Engineering C., Florence, Il.; (F) Cope & MacDonald, Decatur, Ill.; (G) Pittsburgh Filter Mfg. Co., Pittsburgh, Pa.; (H) Mississippi Valley Constr. Co., St. Louis, Mo.; (I) W. T. Delehunty & Co., Decatur, Ill. Wm. G. Clark, Consulting Engineer.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Item No. 1, excavation	$7,000	$12,500	$10,671	$7,100	$7,500	$9,000	$8,325	$6,389	....
Item No. 2, concrete	62,000	67,815	77,883	60,300	63,450	59,500	72,250	69,090	....
Item No. 3, Ex. excav., 50 cu. yds.	50	125	[3]37½	100	100	[2]37½	250	[3]30	....
Item No. 4, Ex. conc., 20 cu. yds.	200	150	[4]180	250	200	[5]150	160	[6]140	....
Item No. 5, brick work	3,200	4,270	4,262	3,375	3,600	3,200	3,675	4,525	....
Item No. 6, steel work	1,200	1,450	1,271	1,300	1,300	1,350	1,320	1,503	....
Item No. 7, carpenter & mill work	2,800	3,200	3,000	3,035	3,350	3,500	3,590	2,685	....
Item No. 8, roof	950	900	725	850	975	810	760	890	....
Item No. 9, gal. iron & sh. metal	450	625	663	580	600	550	525	607	....
Item No. 10, heating	2,100	3,125	....	2,200	2,200	3,000	987	1,988	2,911
Item No. 11, drainage	1,000	1,500	....	880	900	}	560	858	....
Item No. 12, plumbing	250	1,125	....	500	750	} 900	490	1,010	810
Item No. 13, lighting	1,050	1,250	1,440	800	1,000	1,450	971	1,480	....
Item No. 14, sluice gates	....	3,000	....	2,368	2,560	....	2,650	....	....
Item No. 15, piping	....	4,500	....	4,000	4,063	....	4,000	....	....
Item No. 16, filter equipment	....	38,000	....	35,981	36,900	....	36,897	....	....
Item No. 17, chem. devices	....	2,600	....	2,543	2,960	....	3,000	....	....
Item No. 18, machinery	....	4,700	....	3,087	3,725	....	3,650	....	....
				3,787					
Item No. 19, elevator	760	890	500	650	700	....	800	1,520	....
Total Items Nos. 1-13 & Item 19	83,011	....	[7]100,633	....	....	[8]83,443	....	92,715	[9]3,721
Total Items Nos. 1-19	....	151,725	....	129,899	136,833	....	144,810	....	....

[1]75 cents per cu. yd. [2]75 cents per cu. [3]60 cents per cu. yd. [4]$9 per cu. yd. [5]$7.50 per cu. yd. [6]$7 per cu. yd. [7]Except Items Nos. 10, 11 and 12. [8]Except Item No. 19. [9]Items Nos. 10 and 12 only.

Yankton, S. D.—To Ellerman & McLain, contract at $51,212, for installing water works system. Chicago Bridge & Iron Co. will put in iron tank at $12,800.

Seattle, Wash.—By Board of Public Works, for laying of water mains on Tenth ave. West, to Dicken & Rightmire, at $12,480.62.

Vancouver, B. C.—By City, for steel water pipe, to Evans, Coleman & Evans, Ltd., and Robertson-Godson, Ltd., both of Vancouver, at 70 cts. per ft. for 6-in. pipe and 85 cts. for 8-in.

LIGHTING AND POWER

Sulphur Springs, Ark.—Bids are being received for construction of complete lighting and waterworks plant. A. C. Moore, Engr., Joplin, Mo.

Galt, Cal.—Lighting system through both residence and business districts of Galt will shortly be installed as plans have already been approved by members of Board of Town Trustees. Expense of installation is estimated at $3,000.

Dublin, Ga.—Installation of "white way" is being considered.

Macon, Ga.—Citizens will shortly vote on new five-year contract for public lighting.

Lowden, Ia.—Lowden will shortly vote on electric light franchise.

Valley Junction, Ia.—Special election will be held March 14 for purpose of voting whether city will purchase or erect electrical and water works plant. Bonds amounting to $65,000 are proposed.

St. Francisville, La.—Sum of about $6,000 will be expended in improving city light and water plant.

Baltimore, Md.—Establishment of municipal lighting plant is being discussed.

Baltimore, Md.—Plans for a "white way" on Broadway, from Baltimore st. to the market, are being discussed.

Roseau, Minn.—Election will probably be held shortly to vote on issuing bonds for electric light plant.

Beaver City, Neb.—Citizens are said to have voted to issue bonds for electric light plant.

Brooklyn, N. Y.—Assemblyman Robinson of Suffolk has introduced bill permitting State Commissioner of Highways to expend $50,000 for installing poles, wires and fixtures and experimental lighting of portion of State highways.

Toledo, O.—Ordinance has been adopted for lighting of various streets. J. M. Babcock, Clerk of Council.

Providence, R. I.—Improvement of street lighting system is being planned.

Willow Lakes, S. D.—Special election will be held March 4 for voting on bond issue for lighting and water works plant.

Bingham, Utah.—Arrangements have been made by Town Board with Utah Light & Power Co. for immediate installation of 100-watt tungsten lamps to supplant 32-candle-power incandescents now used for street lighting.

Dauphin, Man. — Addition of extra boiler for electric light plant has been authorized, also placing of 40 new ornamental electric 5-light standards on Main st. W. G. Langdon, Publicity Commissioner.

CONTRACTS AWARDED.

Gravette, Ark.—By City, to A. J. Foster of Joplin, Mo., to construct electric light plant and water works; cost about $25,000.

Alameda, Cal.—To Robert Dalziel Co., of San Francisco, contract for constructing wharf and pipe line for municipal electric light plant at $16,229.

Portland, Ore.—Lowest bid received for wiring city jail is said to have been submitted by W. L. Bradley & Co., at $11,245.

FIRE EQUIPMENT

San Jose, Cal.—Remodeling of firehouse on Adams st. is being planned.

Colorado Springs, Col.—Council has passed ordinance calling for $20,000 bond election, $10,000 for motor apparatus and $10,000 for installation of fire-alarm system.

Lewes, Del.—Purchase of combination automobile fire truck is being considered.

New Castle, Del.—About 300 ft. of hose will be purchased.

Lakeland, Fla.—Purchase of motor combination chemical and hose wagon is under consideration.

Cherry, Ill.—Purchase of motor chemical wagon has been authorized.

Fort Wayne, Ind.—About 3,000 feet of hose will probably be purchased.

Shreveport, La.—Purchase of motor apparatus for Company No. 1, additional hose for Company No. 5, and one extra rear auto wheel has been recommended by Fire Chief Chris O'Brien.

Fitchburg, Mass.—Purchase of motor combination chemical and hose car has been recommended by fire committee.

St. Peter, Minn.—Purchase of motor apparatus is being discussed.

Morristown, N. J.—Proposals are being considered for substitution of automobile for horse-drawn fire apparatus.

Morristown, N. J.—Fire committee of Board of Alderman is considering scheme for motorizing of entire fire department.

Princeton, N. J.—Common Council has directed Superintendent of Public Works to obtain samples and prices on 2,000 ft. of hose.

Oswego, N. Y.—Purchase of motor combination hose and chemical car is under consideration.

Poughkeepsie, N. Y.—Alderman Hayden for fire apparatus committee has reported that they had examined several fire apparatus, but had become convinced that one shown by La France Company of Elmira, N. Y., was most suitable for this city and recommended purchase of one type 12, triple combination pumping, the use of Phoenix Hose company; also one type 17 tractor for Davy Crockett Hook and Ladder company for sum of $14,500, less $1,500 for old steamer and hose wagon, and moved that they be purchased.

Rye, N. Y.—After unanimously deciding that they were in favor of purchase of motor fire apparatus for their fire department, Rye Board of Trustees have decided by vote of 4 to 3 to put proposition before voters at special election to be called in near future.

Schenectady, N. Y.—Communication has been received from Commissioner of Public Safety John E. Cole recommending certain changes in preceding communication to Council requesting bond issue for fire equipment. Issue was authorized. It authorizes expenditure of $12,000 for equipment and alterations at Ninth Ward fire station. Mr. Cole now recommends purchase of motor-driven combination pump, hose and ladder wagon at cost of $8,000; equipment of present horse-drawn combination wagon in Bellevue with ladders, and enlargement of sleeping quarters in Station No. 7, and equipment of same at cost of $500.

Cleveland, O.—Purchase of one or perhaps two chemical wagons is under consideration.

Greenville, O.—Ordinance has been passed authorizing $6,000 bond issue for purchase of motor combination wagon.

Middletown, O.—Purchase of motor apparatus is being considered.

Tiffin, O.—Purchase of motor apparatus is being considered.

Emaus, Pa.—Installation of fire-alarm system is under consideration.

Erie, Pa.—Installation of 12 new fire-alarm boxes has been ordered.

Sherman, Tex.—Plans and specifications for erection of new fire engine house in Fifth Ward have been accepted.

Sherman, Tex.—Mayor John C. Wall has opened bids on automobile fire apparatus. The following submitted bids: Seagraves Co., $9,000; Webb Co., $8,500; American-LaFrance, $8,500; Knox Automobile Co., ranging in price from $6,200 to $8,950; Knott Motor Engine Co., from $8,750 to $9,000; Robinson Fire Apparatus Mfg. Co. had in two bids and prices ranged from $8,200 to $9,000.

Temple, Tex.—Bond issue of $25,000 is being discussed for fire department.

Danville, Va.—Motion that uptown fire station be erected has been referred to fire committee. Sum of $500 has been appropriated for purchase of a new fire horse and a triple hitch of harness.

Keyser, W. Va.—Purchase of motor truck is contemplated.

Seattle, Wash.—Fire Chief A. L. Stetson and R. H. Ober, Superintendent of Buildings, are preparing specifications for several pieces of fire apparatus to be purchased soon for local department.

CONTRACTS AWARDED.

Thompsonville, Conn.—To Knox Automobile Co., of Springfield, Mass., contract for one motor hook and ladder truck.

Newark, Del.—By Aetna Fire Company to United States Fire Apparatus Company of Wilmington, for automobile combination hose and pumping machine to cost $9,000.

Urbana, Ill.—Contract has been awarded to Seagrave Co. for one 4-cylinder motor chassis at $4,500.

Bloomington, Ind.—To Ahrens-Fox Fire Engine Co., of Cincinnati, O., contract for one motor combination chemical and hose wagon at $5,500.

Cleveland, O.—To Ford Motor Car Co., for 10 autos for battalion chief, at $583.30 each.

Richwood, O.—To American-La France Fire Engine Co., for one motor pumping engine at $6,400.

Sidney, O.—For 6-cylinder motor triple combination pump, chemical and hose wagon, of not less than 100 h.-p., to American-La France Fire Engine Co., Inc., Elmira, N. Y., at $9,000. Other bids as follows: The Ahrens-Fox Fire Engine Co., Cincinnati, O., $9,500; Nott Fire Engine Co., Minneapolis, Minn., $9,000; Robinson Fire Apparatus Mfg. Co., St. Louis, Mo., $9,000; Watrous Engine Works Co., St. Paul, Minn., rotary pump $9,000, piston pump $9,500; The Webb Co., Allentown, Pa., $8,475.

York, Pa.—Contracts for auto trucks for their chemical engine and hose wagon have been awarded by trustees of Vigilant Fire company to Martin Carriage Works.

Wilkes-Barre, Pa.—By Fire Committee of Council, for furnishing Christy tractor, to Front Drive Motor Car Co., at $4,250.

Sheridan, Wyo.—To Seagrave Company of Columbus, O., for one 6-cylinder, 60 h. p. motor combination chemical and hose wagon at $5,000.

BRIDGES

Pasadena, Cal.—Approving proposed California street bridge over Arroyo Seco, Council has recommended that county draw up plans for reinforced concrete structure which has been agreed upon by city and county.

Atlantic City, N. J.—Question of building bridge between Beasley's Point and Sommers Point is being discussed. It has been decided to have plans prepared at once and they will be submitted to Board of Freeholders of each county at their next meeting.

Columbus, O.—Bids are being received by County Commissioners for furnishing materials and constructing all county bridges during the year, beginning April 1, 1913. John Graf is County Clerk.

Dayton, O.—Plans and specifications have been prepared for proposed new concrete bridge over river at Keowee st. Work will probably be advertised by Director of Public Service Hoglen shortly. Charles A. Gross is Secretary.

Chester, Pa.—County Commissioners have approved plans for concrete bridge 178 ft. long to be constructed over Chester River at Fifth st.

Florence, S. C.—Florence county has petitioned Legislature for authority to issue $500,000 bridge and road bonds.

Chattanooga, Tenn.—Hamilton County is discussing proposition to construct bridge over Tennessee River at Saunders' Creek.

Houston, Tex.—Harris County voters have decided to issue bonds in sum of $1,000,000 for improvement of bridges and roads of county.

Milwaukee, Wis.—City will erect new bascule bridge over the Milwaukee River at Buffalo st. to replace present swing structure.

CONTRACTS AWARDED.

Coatsburg, Ill.—To Dempsey & Schlepman, Fowler, Ill., contract for construction for Renken reinforced concrete bridge.

Pekin, Ill.—By Board of Commissioners of Tazewell county, contract to W. Porter, Mackinaw, Ill., for a 1-span steel and concrete bridge, 32 ft. long, over Rock creek, near Pekin.

Taunton, Mass.—By County Commissioners, contract for construction of Bedford Acushnet bridge, to W. H. Ellis & Co., of Boston, for $24,075.

Little Falls, N. Y.—To Skene & Richmond, Brockport, N. Y., contract for construction of lift bridge at Little Falls. Contract price was $127,471.

Charlotte, N. C.—By Executive Board of city, for construction of overhead reinforced concrete bridge on East Morehead st., over tracks of Southern Railway Co., to Travers Wood Co., of Richmond, Va., at $6,500. A. H. Wearn, City Clerk.

Canton, O.—By Board of Commissioners of Stark county, contract to Peter Christenson, at $409.10, for construction of bridge, near Waco, on Canton-Waynesburg road.

Toledo, O.—By director of public service, contract to Wynkoop, McGormley Co., city, for repairing Western ave. bridge over Swan creek; also awarded contract to A. Q. Thatcher Contracting Co., at $30,244.95, for bridge over Lake Shore R. R. at Summer st.

Aberdeen, S. D.—By Board of Brown County Commissioners, Aberdeen, contract for construction of five bridges, to W. C. Kiernan Co., Aberdeen, S. D., at $10,000.

Belton, Tex.—Bell County Commissioners, contract to Hess & Skinner of Dallas, Tex., to construct three bridges.

Galveston, Tex.—Bids for construction of four highway bridges across inland waterway between Brazos River and Matagorda Bay have been opened at Galveston. Five proposals were submitted, of which that of Blodgett Construction Co., Kansas City, was lowest, being for $10,400. Other bids submitted were S. H. Hudgins, Velasco, $10,800; Spence & Howe Construction Co., Port Arthur, $11,750; C. Q. Horton, Austin, $11,400; the Midland Bridge Co., Kansas City, $16,700.

Floyd, Va.—Floyd County Supervisors contract to Roanoke Bridge Company of Roanoke, Va., to construct bridge across south fork of Little River; cost $2,000.

Norfolk, Va.—E. Cross & Son Co. was lowest bidder on contract for extensive repairs to Ohio Creek and Pascara Creek bridges, bids for which have been opened by Board of Control of Norfolk and Supervisors of Norfolk County. There were four other bidders. Bid of E. Cross & Son Co. was $1,718 for both bridges and next lowest, submitted by Richardson Construction Company, was $1,976. The others were: Alsop & Pierce, $2,530; Seay Brothers, $2,200; W. L. McCoy, $2,057 (for Ohio Creek only). These bridges are maintained jointly by city and Norfolk County, as they connect city streets with county roads. Ohio Creek bridge, larger of two, joins East Brambleton avenue to county road leading to Chesterfield Heights; Pascara Creek bridge connects Maple ave., Berkley, with the road running through stock yards district.

Everett, Wash.—By County Commissioners for construction of steel and concrete bridge over Ebey Slough, to the International Contract Co., Central Building, Seattle, at $28,676. Other bidders as follows: Everett Construction Co., $29,681; Puget Sound Bridge & Dredging Co., $31,251; Graft & Bancroft, $29,209, and Portland Bridge Co., $28,370.

MISCELLANEOUS

Pasadena, Cal.—Announcing that revenues of city for coming year will not be large enough to make certain municipal improvements, Council has read resolution setting forth various bond issues which will be submitted to people, probably next month. Resolution sets aside $35,000 as necessary to take up options upon land wanted for Arroyo Seco Park, $87,000 for transforming fire department from horse-drawn to auto, $81,000 for Carmelita playground, $54,000 for Monks Hill, and $50,000 for the east side playground, a total of $307,000.

San Francisco, Cal.—Bids for track construction on Market st. for municipal railway have been opened by Board of Public Works, F. Rolandi and F. E. Hilmer, two of eight bidders, tied on lowest offer, $21,990. Other bids were: Healy-Tibbitts Company, $34,000; R. C. Storrie & Co., $26,000; Contra Costa Construction Company, $25,500; A. J. Raisch, $26,920; Central California Construction Company, $23,800; Union Construction Company, $24,248.

Wilmington, Del.—The Legislature having passed and Governor Miller having signed all acts enabling city and county to proceed with issuing of bonds and building of joint $1,500,000 city hall and county court house on block at Tenth, Eleventh, King and French sts, City Council has taken first formal action toward accomplishment of this great project.

Tampa, Fla.—Erection of new city hall on present city hall site is under consideration.

Cairo, Ill.—By vote of 183 to 57, bond issue of $100,000 for raising and strengthening of 21 miles of Cairo's levee system has been carried at special election. As result of this election nearly $375,000 will be expended on levees of Cairo and drainage district.

Danville, Ky.—Bids will be received until 2 p. m. March 15, at Water office, by J. M. Wallace, Mayor, for $10,000 worth of work house bonds.

Long Branch N. J.—Beach improvement bonds in sum of $14,000 will be sold March 1. F. L. Howland, Comptroller.

Passaic, N. J.—Director of Streets and Public Improvements has been ordered to purchase 20th century street cleaning cans and 20th century can carriers with wooden wheels.

Ithaca, N. Y.—Council has approved of establishment of municipal abbatoir.

Oswego, N. Y.—Commissioner of Public Works John Smith has announced that municipal improvements costing upward of $300,000 will be started in spring and that greater portion of work will be completed during season.

Poughkeepsie, N. Y.—Board of Health requests Board of Aldermen to call taxpayers' election for purpose of appropriating sum of not less than $200,000 for building and equipment of municipal hospital.

Schenectady, N. Y.—Clerk Pifer has been authorized to advertise for bids for 5-passenger automobile for use of City Engineering Department.

Syracuse, N. Y.—Park Commission has passed resolution requesting Board of Estimate and Apportionment and Common Council to authorize bond issue of $200,000 for purchase of land for public playground in southeastern section of city and for equipment of playground, erection and equipment of public bathhouse.

New Bern, N. C.—County is contemplating purchase of large tractor which will be used in pulling machines used in shaping up roads.

Akron, O.—Ordinance has been passed to issue bonds in sum of $3,500 for purchasing automobile patrol and motorcycle.

Monroe, O.—Common Council has passed resolution to submit to voters proposition for bonding city for $10,000 for municipal hospital.

Harrisburg, Pa.—Alternative plans for river front wall which are being prepared by engineers of Board of Public Works in case bill in Legislature, providing for dam across river below city, goes through, will be completed by about March 10. If they are passed, bids for work will be advertised for about April 1, so that work may begin early. Dam will cost about $200,000.

York, Pa.—Bill authorizing proposed loan of $200,000 for permanent city improvements will probably be framed immediately and hurried before City Council as basis for action upon appropriation and tax ordinances.

Charleston, S. C.—Appropriation of $1,900 is being considered for purchase of new auto for fire chief.

Knoxville, Tenn.—Auto patrol for Knoxville and also installation of Gamwell police alarm system will be asked for by Commissioner James A. Hensley, of department of public safety, under police appropriation for 1913.

Knoxville, Tenn.—Issuance of $50,000 in bonds for purchase of property for city park sites is favored by John W. Flenniken, commissioner of streets and public improvements.

Dallas, Tex.—Bond issue of $500,000 for parks, playgrounds and boulevards is proposed.

Seattle, Wash.—Bill has been introduced appropriating $5,500 for purchase of auto truck for use in garbage division of Health Department.

Spokane, Wash.—First lot of city improvements for spring of 1913, numbering five, and estimated to cost $28,040, have been recommended to City Council by Commissioner of Public Works D. C. Coates.

CONTRACTS AWARDED.

Los Angeles, Cal.—Creosoted material to be used in construction of bulkheads in what is known as pier A at Wilmington will be furnished by Pacific Coast Creosoting Co. Contract was awarded to this firm by Board of Public Works on bid of $13,331.59.

Hazard, Ky.—For construction of new jail, to Smith Fireproof Construction Co. at $25,000.

Baltimore, Md.—As evidence of intention of Water Board to carry out its plans for filtration plant, bids have been opened by Board of Awards for railway to run from Harford road to site of proposed filtration plant and reservoir at Lake Montebello. Over this spur track material to be used to construct filtration plant and the reservoir in which water will be stored before undergoing filtration will be carried from tracks of United Railways. There were three bidders. Bid of Malcolm W. Hill ($11,555) was lowest; that of Whiting-Turner Construction Co. ($12,549) next lowest. C. W. Lane & Co., who are constructing filtration reservoir, bid $18,943.

St. Paul, Minn.—At contract price of 9.35 cents a cubic yard, State Drainage Commission has accepted bid of I. N. Banta of Forest Lake, for dredging yet to be completed in drainage project in Kittson county known as ditch 84.

Victoria, B. C.—For construction of jail to B. C. Construction & Engineering Company, at $223,465. W. Ridgeway Wilson is architect.

Proposal Advertising

Municipal officials will serve their constituents well by seeing that PROPOSALS FOR MUNICIPAL IMPROVEMENTS of all kinds are inserted in

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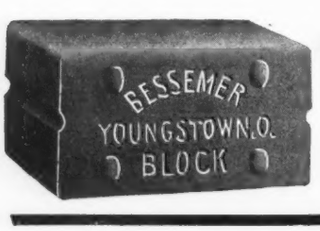

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